VOL. XXVIII. No. II NOVEMBER 1943

MECCANO MAGAZINE

THE FARM TRACTOR

6d.

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2. 2nd Lieutenant.
3. 1st Lieutenant.
4. Captain. 5. Major.
6. Lieut.-Col. 7. Colonel.
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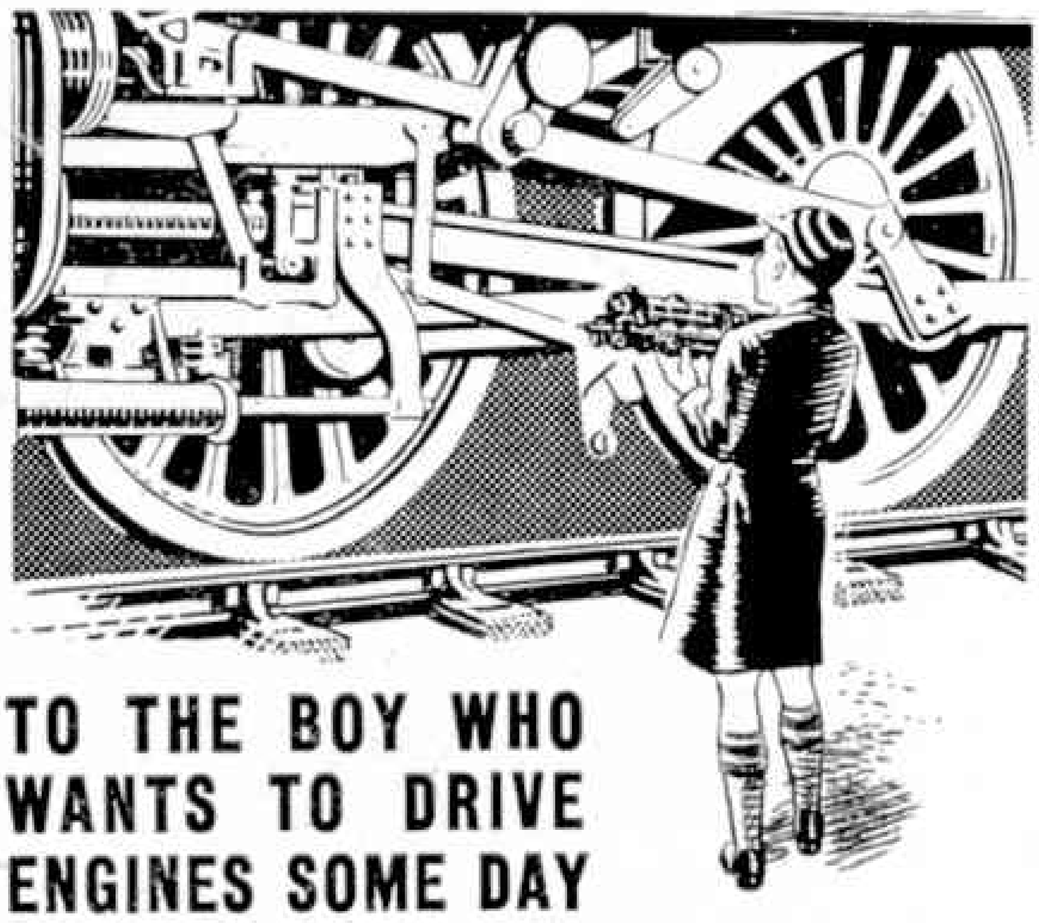

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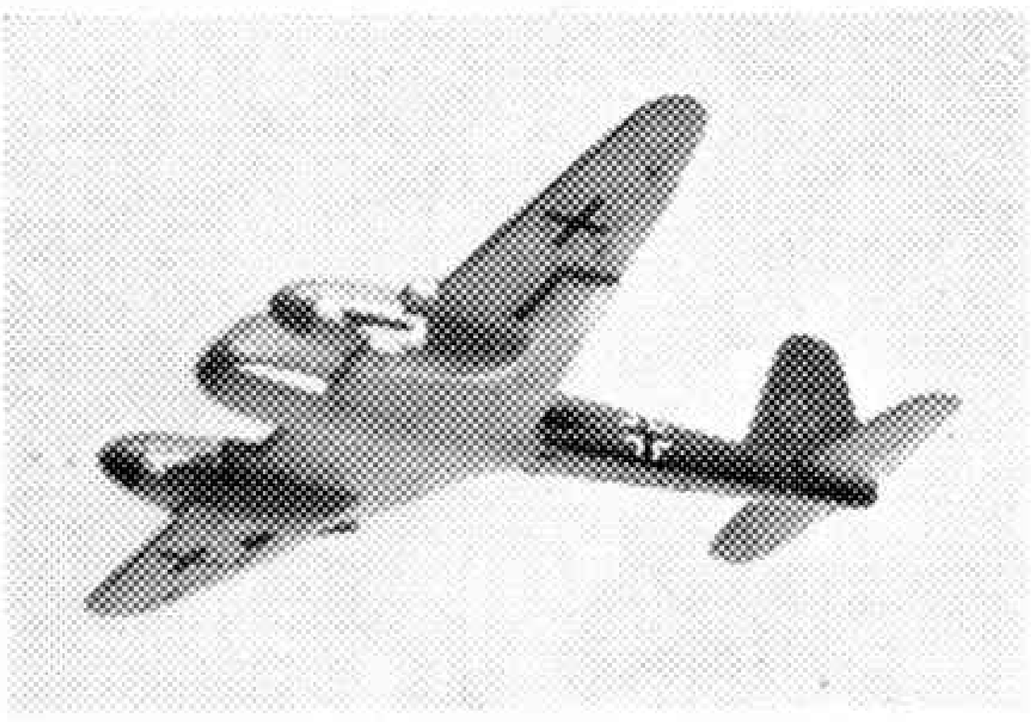

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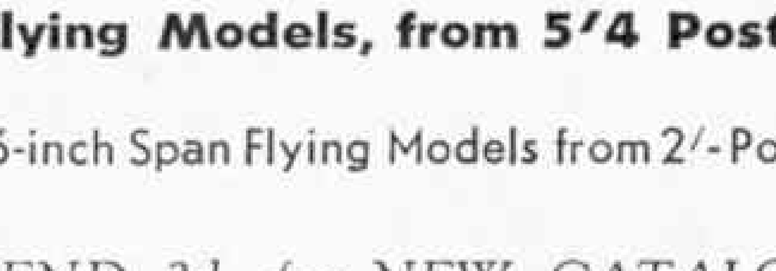

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THE SPY-CLISTS. Michael clambered over the hedge to rescue the sketches and a moment later they were all put back in Miss Skinner's portfolio. "You're sure they're all there?" she queried —(1)—. "Yes," said Michael confidently, and he and Monica —(2)— Miss Skinner gather up her things and walk away.

But when they were cycling homewards along the lane that same evening Monica gave an exclamation. "Look! There's one of Miss Skinner's sketches —(3)— in the pond!"

Michael —(4)— it out with a stick. "It's the one she gave the new schoolmaster," he said. "We can't give it back to him all —(5)—. I'll lay it in the —(6)— to dry."

"Don't touch the paint," Monica —(7)— him, "or the colours will run."

"They seem to be running now," said Michael. "At least," he amended, "not running but doing something queer."

And they certainly were. In the hot sun the —(8)— of the cottage garden just —(9)— away and in its place was a line of writing: "BRING PLANS TO COTTAGE THURSDAY NIGHT. X.3."

All you have to do is to supply the 9 words which have been left out of the story. Write each one against the proper number in spaces provided on this form. Fill in your name, address, and date of birth, cut out and post to B.S.A. Cycles Ltd., Missing Word Competition, Dept. M.4, Small Heath, Birmingham, 11, to be received not later than December 4th. There are 3 prizes of £5, £3 and £2 for the best and most apt sets of answers. If two or more entrants tie for any one or more prizes, the prize or prizes will be divided equally between those entrants. Not more than one solution may be submitted by an entrant. The competition is limited to boys and girls under the age of 15 on the 1st. November, 1943. The decision of B.S.A. Cycles Ltd. is final and no correspondence can be entered into. Names of winners will be published later in this paper.

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MECCANO MAGAZINE

Editorial Office:
Binns Road
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Vol. XXVIII
No. 11
November 1943

With the Editor

The Isles of Solomon

During the past year or so we have heard a good deal of the Solomon Islands, and many of my readers must have wondered how these dots on the map of the Pacific Ocean got their name. The story is something of a romance.

It seems that in 1567 a Spanish explorer named Mendana sailed from Peru with the idea of finding a continent supposed to lie to the South in the vast expanse of the Pacific. All that he found was a group of islands, reached after a prolonged cruise of about 7,000 miles, which he greeted joyfully in the belief that they were outlying portions of the continent of which he was in search. In anticipation of the riches he expected to find, Mendana called his discoveries the Isles of Solomon, no doubt thinking of the expeditions that Solomon sent to the South to bring back the gold and spices of Ophir.

The islands Mendana found were in the southern group; the northern islands were discovered in the following century by Bougainville, a famous French explorer, and one of them that has been prominently in the news in late months was named after him.

Leaders in the War

Lieut.-Gen. Mark W. Clark

Lieut.-General Mark Wayne Clark, commander of the Allied Fifth Army in Italy, was born in 1896 in Madison Barracks, New York, and has lived in a military atmosphere ever since. He graduated from the U.S. Military Academy in 1917 and was then commissioned 2nd Lieut. of infantry. He saw active service in France, and later became an expert in the use of tanks and mechanised cavalry, and eventually of airborne troops.

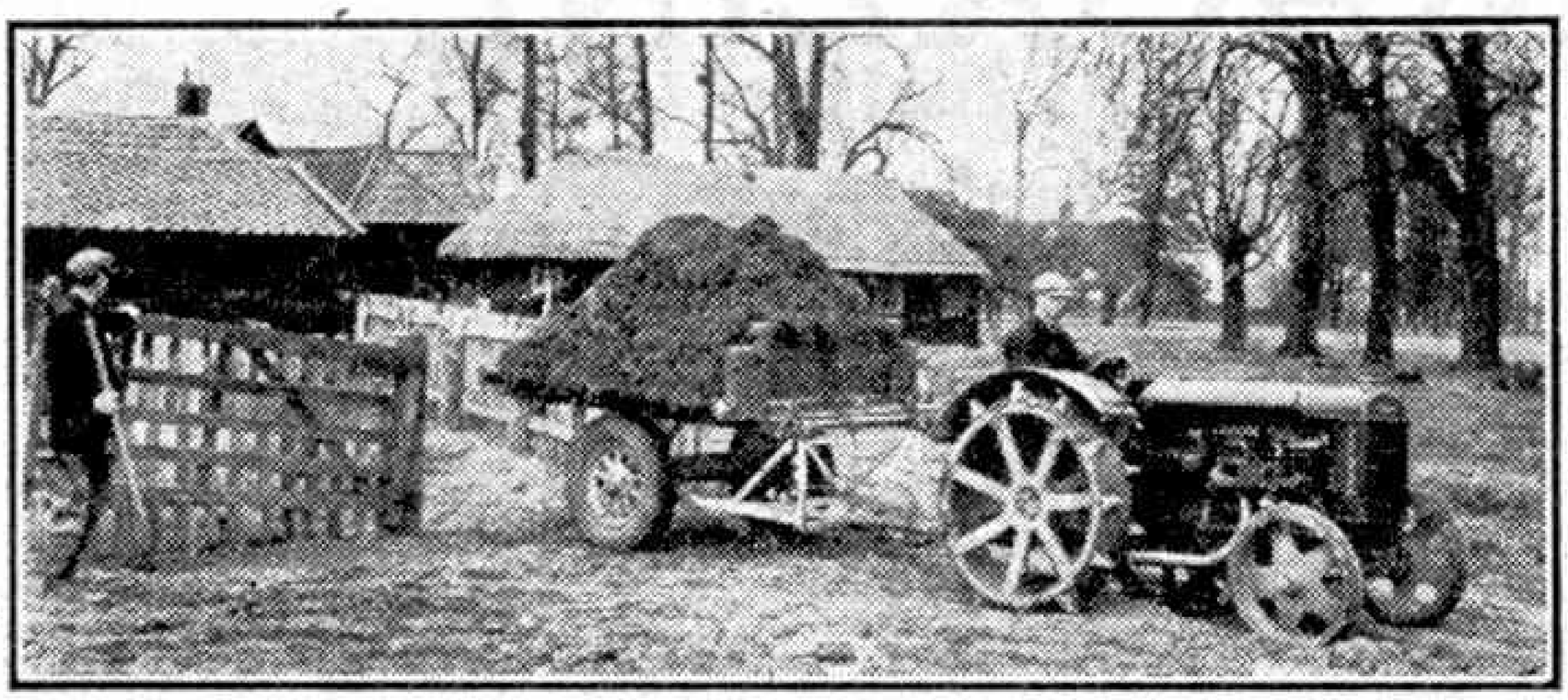
Lieut.-General Mark Wayne Clark.

On the entry of the United States into the war General Clark held for a time the post of commander of that country's ground forces in Europe. His first outstanding exploit came in 1943, when, in company with British and American officers, he was landed in Algeria from a submarine to make secret contact with French officers and to concert plans for the great landings in North Africa.

After the conquest of North Africa and Sicily, General Clark's Fifth Army landed on the beaches of Salerno, and there scored the great triumph that is so fresh in our minds. His army is still moving on.

The Tractor on the Farm

DURING the nineteenth century steam power began to be applied to agricultural machinery, particularly for ploughing and for threshing and similar operations. The great drawback to the steam engines then used was their weight and general unwieldiness, and this seriously limited their use. During recent years this drawback has been largely overcome by the introduction of the internal combustion engine, particularly in the form of the tractor running on petrol or vaporising oil.



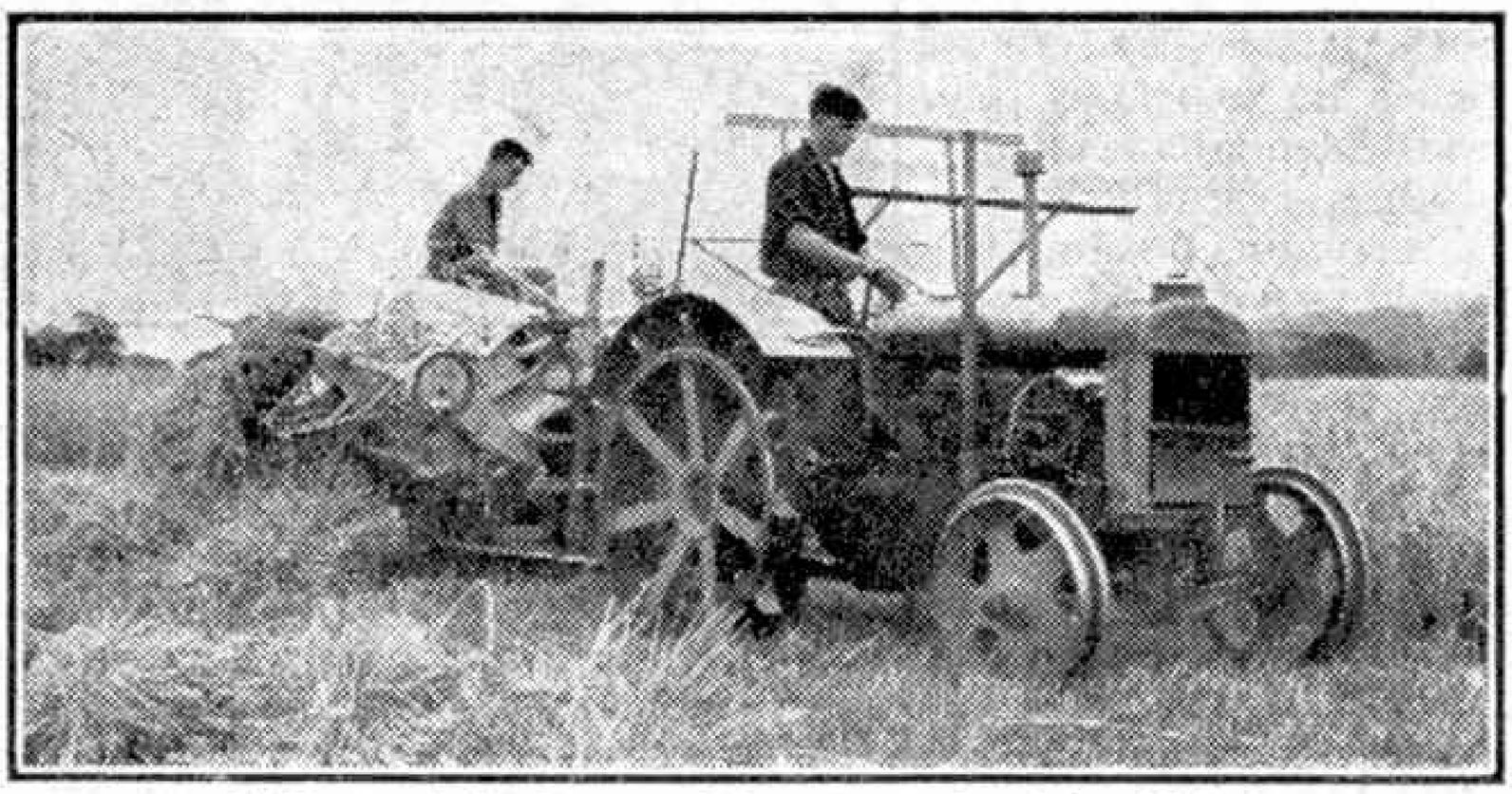
Fordson tractor hauling manure to the potato field. Photographs by courtesy of Ford Motor Company Ltd.

Experience has shown that one of the most useful types of tractor for general farming is the medium-weight machine, capable of pulling two-furrow or three-furrow ploughs according to conditions. One of the best known machines of this type is the Fordson, which is a British product throughout, manufactured at Ford Works, Dagenham, Essex. To-day there are over 800,000 Fordson tractors in use throughout the world, and some of them manufactured as far back as 1917 and 1918 are still in use. The range of duty of the Fordson is extremely wide. It will plough at maximum depth in the heaviest land; subsoiling, mole-draining, stump grubbing and many other heavy jobs can be tackled; and it has plenty of power to operate a full-sized binder or thresher.

Our cover, showing a Fordson tractor ploughing a field in which Autumn wheat will be sown, is based on a photograph kindly supplied by the Ford Motor Company Ltd.

There is still a rather widespread idea that a tractor is useful chiefly during ploughing and harvest, but thousands of Fordson owners can disprove that impression. At a conservative estimate it may be said that there are at least 50 jobs on the average farm for which a Fordson can be used. They range from cultivating, harrowing, discing, rolling and all operations incidental to the preparation of seed beds, to seeding, mowing, hay raking and loading, hauling, binding, threshing, etc. The tractor provides cheap, abundant and unvarying power for all belt-driven machinery; an engine governor is fitted as standard equipment, and the governed engine will run steadily for hours without attention.

The actual cost of performing practically all ploughing, tillage and harvesting operations by tractor show substantial saving as compared with older methods, but this is by no means the sole advantage. The increased speed of the tractor is often



Cutting a field of corn with a tractor-hauled self-binder.

a tremendous asset. It enables the owner to take maximum advantage of favourable weather, and by saving a field of hay or corn may pay a considerable part of its cost in a single season. Again, the tractor is tireless. By employing two or more men in consecutive shifts work can go on as long as daylight remains, or even throughout the 24 hours.

Tractor haulage makes it possible for a big load to be handled.

The general design of the Fordson tractor is too well known to need a long description. It has a simple and robust 4-cylinder engine which, with the transmission and other assemblies, is built to precision standards, so that with reasonable care and attention the tractor will give years of unfailing work. Recent design advances have included a new oil-type air cleaner giving still more efficient protection of the engine; easier steering, and a vertical exhaust pipe which removes the exhaust from the vicinity of the driver's feet. The fitting of a radiator blind allows the working temperature of the engine to be controlled and contributes to maximum power output with fuel economy. Lubrication is simple, and efficient, and the use of roller bearings in all working parts reduces friction and ensures a long working life.

Fordson tractor operating a full-size threshing box.

To provide the owner with a tractor ideally suited to his individual conditions, the Fordson is, in normal times, available in various types and with alternative transmissions and gear-ratios. In addition to the standard agricultural tractor with cleated wheels or spade lugs, the land utility tractor, with pneumatic tyre equipment, is in wide use. This is particularly suitable for haulage in addition to general field work, the low-pressure tyres providing excellent grip of ploughed land or grassland, while being entirely suitable for use on hard roads without the need for wheel bands. The standard tractor is capable of doing more work per day than two pairs of horses and two men. Its capacity in ploughing is approximately half to over one acre an hour, depending on the land and the type of plough used. Another special tractor is the Fordson golf course tractor, which has been developed for the upkeep of parks, golf courses, aerodromes, etc. The alternative of a 4.3 or 7.75 transmission is offered on the agricultural, land utility and golf course tractors, on which alternative gear-ratios are also available.

On account of its light weight the Fordson tractor does not harm the land. The standard agricultural tractor weighs, less fuel, etc., approximately 29 cwt.; the corresponding weights of the land utility and golf course types being respectively about 31 cwt. and 24.11 cwt.

It is interesting at the present time to recall that it was in 1917, during a previous crisis in this country's history, that the Fordson was introduced. It then played a vital part in helping *(Continued on page 394)*

All Among the Bombers

II—The Amazing Ground Staff

By C. G. Grey

Founder of "The Aeroplane" 1911, Editor until September, 1939

ONE of the most astonishing things about this bombing business is the vast number of people who are at work on the ground when a big raid is on. During the last war several would-be clever people raised a row in the House of Commons because they had discovered that 30 men were employed on the ground to keep one aeroplane in the air. They seemed to think that they could do it themselves with half-a-dozen men. I worked it out on paper and, having some inside knowledge then, as now, I could not get the figures down to less than about 50 men per machine. I wonder what these critics would say about modern figures, especially for the big bombers.

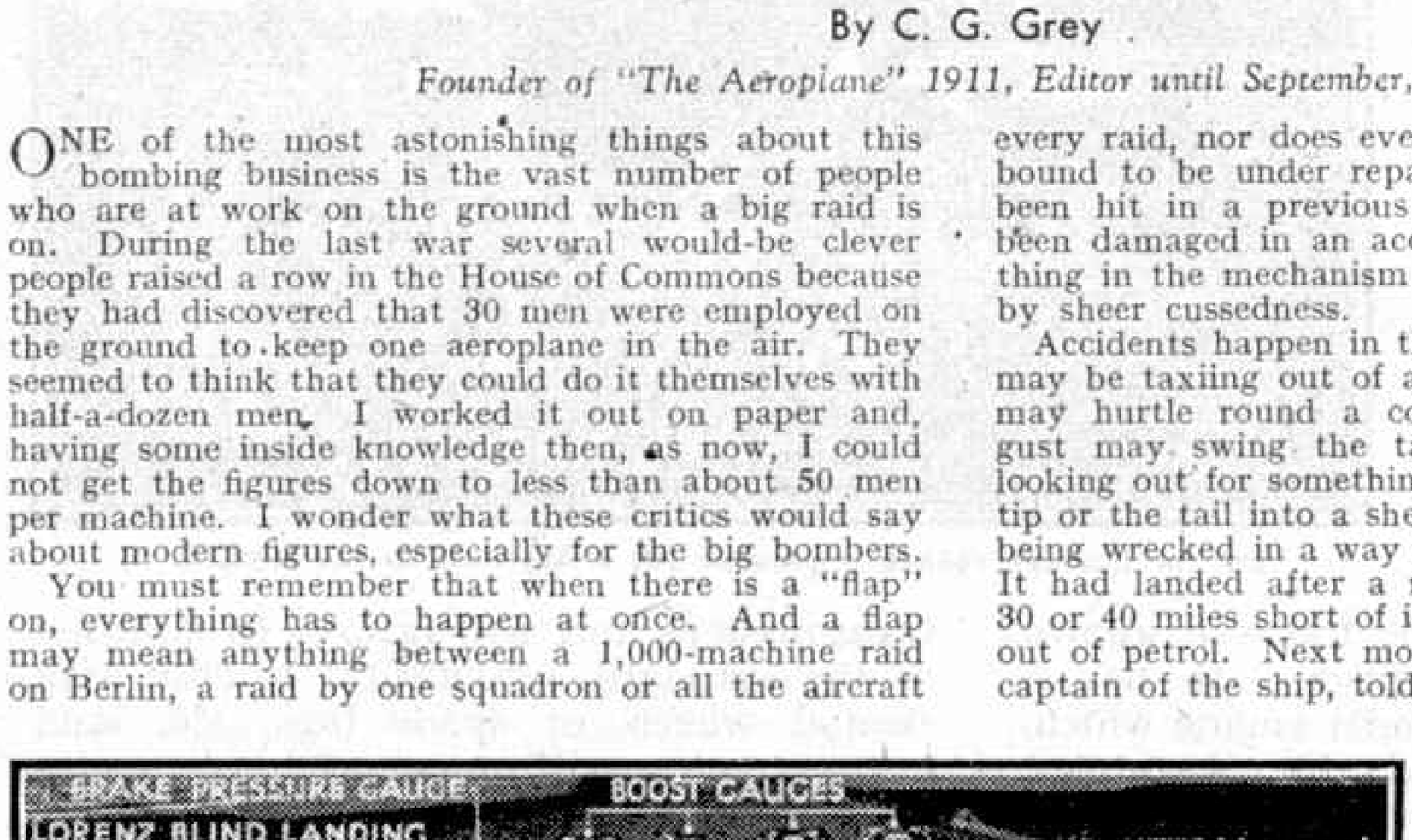
You must remember that when there is a "flap" on, everything has to happen at once. And a flap may mean anything between a 1,000-machine raid on Berlin, a raid by one squadron or all the aircraft at one station or one Group on a small target, and a mere removal of the Wing or whatnot from one station to another. In fact moving a whole squadron may cause a worse flap than a saturation raid, because a raid on a big scale only concerns the air-crews and the ground-crews and the operational staff, whereas moving a squadron means pulling up by the roots all the cooks and batmen (or batwomen) and clerks and all the assorted W.A.A.F.s and typists and book-keepers—a frightful job—and planting them somewhere else, not to mention the O.C. Squadron and his household, and his wife and family who are probably lodging some miles away.

Apparently the only "authorised wives" on an air station in these days are those of the Station Commander or Base Commander and, on some stations, generally non-operational, the wives of certain dug-in permanent officials, either technical or administrative. In fact an air station in these days might almost be described as an island of Service men and women entirely surrounded by wives and girl friends. But we are at the moment concerned with the working of a big raid.

Before a raid can start, obviously every machine which has been told off to go must be in tip-top order. And naturally every aircraft "on charge" to each squadron on a given station does not go on every raid, nor does every crew. Some machines are bound to be under repair, either because they have been hit in a previous raid, or because they have been damaged in an accident, or just because something in the mechanism has worn out or gone wrong by sheer cussedness.

Accidents happen in the queerest ways. A machine may be taxiing out of a shed and some ass in a car may hurtle round a corner and run into it, or a gust may swing the tail round while the pilot is looking out for something else, and may bash a wing-tip or the tail into a shed. I remember a big bomber being wrecked in a way which might seem impossible. It had landed after a night raid at a station some 30 or 40 miles short of its own, because it was nearly out of petrol. Next morning the pilot, who was the captain of the ship, told the men on the petrol pump to fill only the inner tanks, next the fuselage, as the journey was short and the machine would handle more easily with the outer wing-tanks empty. It took off perfectly. Just outside the aerodrome all the four engines stopped at once. It crashed into a wood and caught fire. The pilot, the engineer, and two or three others were killed. The radio man and a gunner, who were aft in the fuselage, got out alive, but burnt.

They reported that as soon as the machine was off the ground one of the men up forward turned the petrol-cocks over from the inner tanks to the outer tanks, not knowing that they were empty, so as soon as the petrol in the carburetters was used the engines stopped.

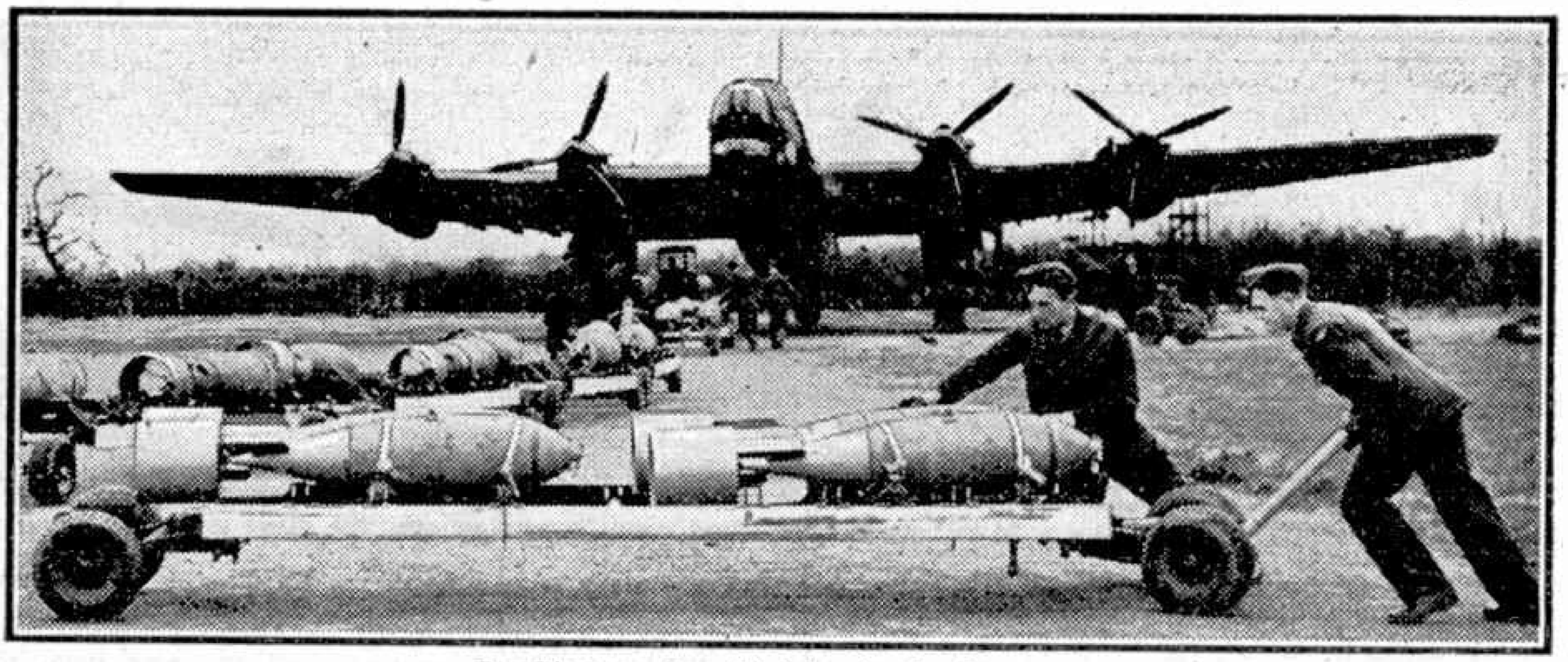


Short "Stirling" instrument panel, showing the mass of indicators.

Switching over to the out-board tanks was correct cockpit drill. If the petrol in the outer tanks has been used by the time the machine reaches the target it is lighter on its aileron controls and the pilot can dodge, or "take evasive action" as the official phrase has it, more easily, so the outer tanks should be emptied first. Only this poor chap ought not to have switched over without asking for orders from the pilot. His wish to be busy cost his life and the lives of three or four others, not to mention £25,000 or £30,000 worth of manhours in the making of the machine and its engines and equipment.

Anyhow, assuming that a given station has enough aircraft in "operational" order, as it is called, to be sending out a squadron or more on a big raid, consider the number of men, and women, concerned with each machine.

You have all seen photographs of the instrument-boards of modern aircraft—some people call them "dashboards," a curious and quaint survival of the days of horse-carriages, when the panel in front of the driver was there to prevent mud from being dashed up by the horses' hoofs. Well, each dial on that board, and probably a dozen or more behind or round the corners which the flight-engineer has to watch, is an indicator for some part of the working mechanism of the aircraft, and each of those parts



Bombing-up. Beautiful bombs for Germany.

needs a specialist to look after it, and probably several helpers.

Moreover, each machine has its own ground-crew, and that crew must include members who are specialists enough to tell whether there is anything the matter with any of those indicators or the part which they belong, if the pilot or any of the crew reports that something has gone queer. There is a boss specialist in that line in the squadron, and a still higher specialist on the station, to whom the man in the ground-crew can go for help if the job or the puzzle is beyond him. But the crew must do their best to put things right on their own.

That must be so, because, when a whole squadron comes in from a raid, and each machine has taxied off the runway to its "dispersal point"—a long way from the main buildings so that not more than one machine can be damaged at a time by an enemy raider—its own ground-crew has to set to work to get it into flying order as quickly as they can, because it may be wanted again that same evening. So all that the squadron or station specialist can do is to inspect each machine when it is reported as operational again, and see that the work on his special part of the machine has been properly done. Or, if the ground-crew's own specialist is stuck by some puzzle, he may send for the specialist to come and find the answer.

Thus you find station engineer officers and station armament officers and station radio officers and station navigation officers, and other top specialists. Below them are squadron officers who are specialists in the same lines but are only responsible for their own squadrons. And further down are the flight sergeants in the same lines of business, each of whom is responsible for the machines in his flight being in proper order so far as his speciality is concerned.

The number of men in each ground crew varies according to the size of the machine. Naturally the number needed to keep a "Lancaster" or "Halifax" or "Stirling" in the air is far greater than that needed for a "Hurricane" or "Spitfire." I may not tell the number in either case, but just think of the jobs to be done.

Take the engines first. In a "Merlin" there are 48 valves per engine to be checked and perhaps adjusted; 192 valves in all. (In a "Sabre" there are twice as many but it is not used in bombers). They all have to be inspected after every trip. In a "Hercules" the sleeve-valves are not adjustable, but there are 14 cylinders instead of 12, and there are other things to be inspected. Carburetters are as big as motor-cycle engines and far more complicated, and a carburetter man is a specialist. Ignition is another specialist's job. Then think of the inspection of cowling, of cooling gills, of exhaust-pipes.

Before the war one of the chiefs of Imperial Airways Ltd. told me that they spent £300 a day on exhaust-pipes for their "Pegasus" engines. It seemed incredible, but I worked it out from facts that I knew and it was right. What must be the cost of such things in the R.A.F.? Just fair wear and tear caused by corrosion and erosion and the scouring blast of exhaust gases.

Consider then those enormous undercarriages and their oleo-pneumatic legs and their dash-pots and the hydraulic pipes and rams, or electric motors and gears, which push or pull them up or down, and the electric signal gadgets that tell whether they are locked home or not. You cannot turn an ordinary garage mechanic onto keeping that lot in order. All the same, a good garage mechanic is one of the best men on those jobs because he is so adaptable and versatile.

Think of the masses of rods and bell-cranks and levers of the controls of the rudders and elevators and ailerons and their trimmer-tabs. All those must be inspected, because a snick of a bullet or a flak-splinter may cause a crack which on the next trip may mean a breakage and a crash. And there are the hydraulic or electric controls of the bomb-doors, which do quite heavy work. Incidentally, there is a tendency to prefer electric power to hydraulics for all these jobs. An hydraulic pipe-line is as easy for a bullet or splinter to cut as is an electric wire, but it takes a lot more repairing. Those are not jobs for ordinary mechanics. Each needs special training. And the engine specialists look after their own controls and those of the delicate mechanism of the variable-pitch airscrews.

The ground crews do not worry about bullet holes or chunks of a fuselage or a wing or a control surface blown out by flak. They just cut the edges clean and rivet on a fresh piece of metal and paint it over, which means that one must have painters in the squadron, though not in each crew.

Each ground crew must have its own electricians. There are miles of cable in a big bomber, each cable with a mass of little wires in it and each wire in a different coloured tube, so that if the cable be cut the worker can recognise what is on the other end of the wire. Each wire goes to its own terminal plug in a multiple-plug junction-box. How the original wirers keep them to the right terminals is a marvel. But I *have* heard of a pilot switching on an engine and having the dinghy inflate itself and jump out on the floor of the shed because somebody had made a wrong connection. That could not happen in the air, fortunately.

On top of that there is the mechanism of the gun-turrets and their hydraulics or electrics, which is quite apart from the guns that go into them. And there is the electricity of the intercommunication lines and of the navigation lights and the landing

"Halifax" bomber on a 24-hr. overhaul. Ground crews swarming over the giant aircraft.

lights and all the internal lighting. And there is the electricity which arms the fuses of the bombs and then drops them.

Over and above this are two great branches which have nothing to do with the operation or mechanism of the aeroplane itself—Radio and Armament—and yet are two major essentials to the success of a raid.

There are so many sorts of radio, radio-telegraphy, radio-telephony in long and short waves and ranges, and so forth, that the radio men in the ground crews must be all very highly trained and educated men. If a radio set has been plugged by a bullet on a raid, drawing a new set from store and fitting it into the machine might seem simple enough, but one has to know the how and why about it.

Armament is nearly as bad. The standard Browning or Vickers machine gun has its own tricks. And the belts have to be loaded with different sorts of ammunition—armour piercing, incendiary, tracer and others. The 20 mm. cannon-gun is not used in our big bombers, nor is the half-inch, of which the U.S. Army Air Corps is so fond, but cannon are used in "Beaufighters" and "Mosquitoes" with good effect.

I believe that a few "Lancasters" or "Halifaxes" without bombs, but stuffed full of heavy guns and ammunition, flying with a big fleet of bombers, and looking like ordinary bombers, might give a nasty shock to the German night-fighters. Meantime the armourers who look after the machine-guns have plenty to do.

The last group I mention are the people who handle the bombs, large or small, all the way from the 4-ton block-buster to the littlest incendiary. Those bombs are kept in underground stores, and the armament people have to fetch them out and fit the right sorts of fuses to them. They are quite safe even if one drops them, but the fitters of fuses have to know what they are doing. And the people who fit them into the bomb-racks and adjust the dropping gear must know their jobs.

That is only a rough idea of what the ground crews of each machine have to do. And remember all that has to be done to every machine of the squadron between its landing in the early morning and starting time in the evening, when it may have to go out again. The result is that the ground crews have practically no rest except during the few hours when the machines are out on a raid. Even then a skeleton crew is kept on duty in case the machine comes back without reaching its target—then they have to set to and discover what went wrong.

Do you wonder that dozens of men are needed for each ground crew? And then there are station work-shops, with machine-tools, where jobs are done which ground-crews cannot do out at the dispersal points. So much for the mechanical side.

Then there are the cooks and batmen (or women, for those are mostly W.A.A.F.'s jobs in these days). And there are W.A.A.F. parachute packers—every parachute must be released and re-packed once in every three or four weeks to make sure that it has not got wet or mouldy, and so become liable to jam or stick or burst. And there are W.A.A.F. armourers and drivers.

There are the more normal feminine jobs such as clerks and typists, who are very hard worked when there is a flap on, because all messages (or signals) from and to those in authority must be put on paper, generally in duplicate. The fashion is to jeer at putting things on paper. But think what a mess there would be if the responsibility for orders and actions could not be traced afterwards. Neither praise or blame could be given with certainty.

A job all to itself is the Air-Sea Rescue Service, of which I hope to write later. It exists to pull out of the North Sea or the Bay of Biscay any of our bomber crews who have fallen in. Fighter Command runs its own Rescue Service. The number of lives saved is surprising.

Remember also the Signals Branch which transmits all these messages between stations and bases and group headquarters right up to the Headquarters of the Air Officer Commanding-in-Chief, Air Marshal Sir Arthur Harris himself, whose word is law, all the way down to the humblest "erk" or Aircraftman 2nd Class, who is generally regarded as the lowest form of human life.

There are people called Intelligence Officers who interview the crews when they come in from raids. I always like the story of the bomber captain who marched up to the Intelligence (*Cont. on page 394*)

Cutting away damaged sections of aeroplane for repair.

Have You Ever Thought About This?

VII.—How a Ship is Steered

By D. Rebbeck, M.A. (Cantab.), A.M.I.Mech.E.

ONE of the most amazing facts about large ships is the remarkable small rudder which is used for altering the course of the vessel as she ploughs across the seas. The average person accepts this fact without even bothering to reason why, and a few words about rudders in general may not be out of place in these days when so many important events depend upon our ships as they turn and twist in convoy to their destinations.

The simplest form of rudder is a flat plate of wood or metal attached to the stern of the ship, so that it can be turned to either side about its vertical axis. When it is in its neutral position, parallel to the centre line through the hull of the ship, it has, of course, no influence on the direction in which the ship is moving, this influence only coming into force when the rudder is turned to port or starboard. The pressure of the water acts upon the inclined surface of the rudder and so pushes the hull to one side or the other as the helmsman alters course.

We all know that in small boats the rudder is moved and controlled directly by a tiller, and we understand, or should do so, that as the size of the vessel increases, the force necessary to move the rudder against the water pressure becomes too great for one or more human beings to handle. We have probably seen pictures of the poop of old sailing vessels, where two or three men are hanging frantically on to the spokes of a huge wheel—sometimes they had to be lashed to the wheel—and fighting to hold the ship on her course. Well that was in the nineteenth century, and although even to-day one may see an old-fashioned tramp steamer with an emergency "direct drive" helm, modern times have demanded and obtained a more acceptable arrangement.

Until the advent of the so-called "balanced" rudder, the larger the ship the more massive the rudder became, so that an extreme case may be considered in the mammoth liner *"Olympic,"* which had a simple type rudder almost 80 ft. high! This naturally demanded great power to operate and hastened the development of the balanced rudder. The general design has a part of the blade forward of the rudder post, so that the water pressure is utilised to balance its own effect and in consequence there is a considerable reduction in the force needed to operate the helm. There are various makes based on this design, but they are all based on the same principle and achieve the same object.

Clever brains have devised further improvements in steering at sea, and have led to the introduction of the now famous "Flettner" and "Oertz" rudders. The first-mentioned consists of a main balanced rudder, completely free to rotate, and having attached to its after edge a small secondary rudder which controls the main rudder's angular position; in other words the small rudder steers its large brother which in turn steers the ship. All movement of the helm is directly transmitted to the secondary rudder, the force required being naturally comparatively small. As the helm is moved, the balance of the main rudder is upset, and it will turn until it reaches a position of stability, and thus steers the ship. The great advantage of this system is the small space required for a ship to turn in, and the immediate answering of the vessel to the helm. At extreme angles of helm it is far superior to the ordinary rudder blade, and it offers less resistance to the forward motion of the ship.

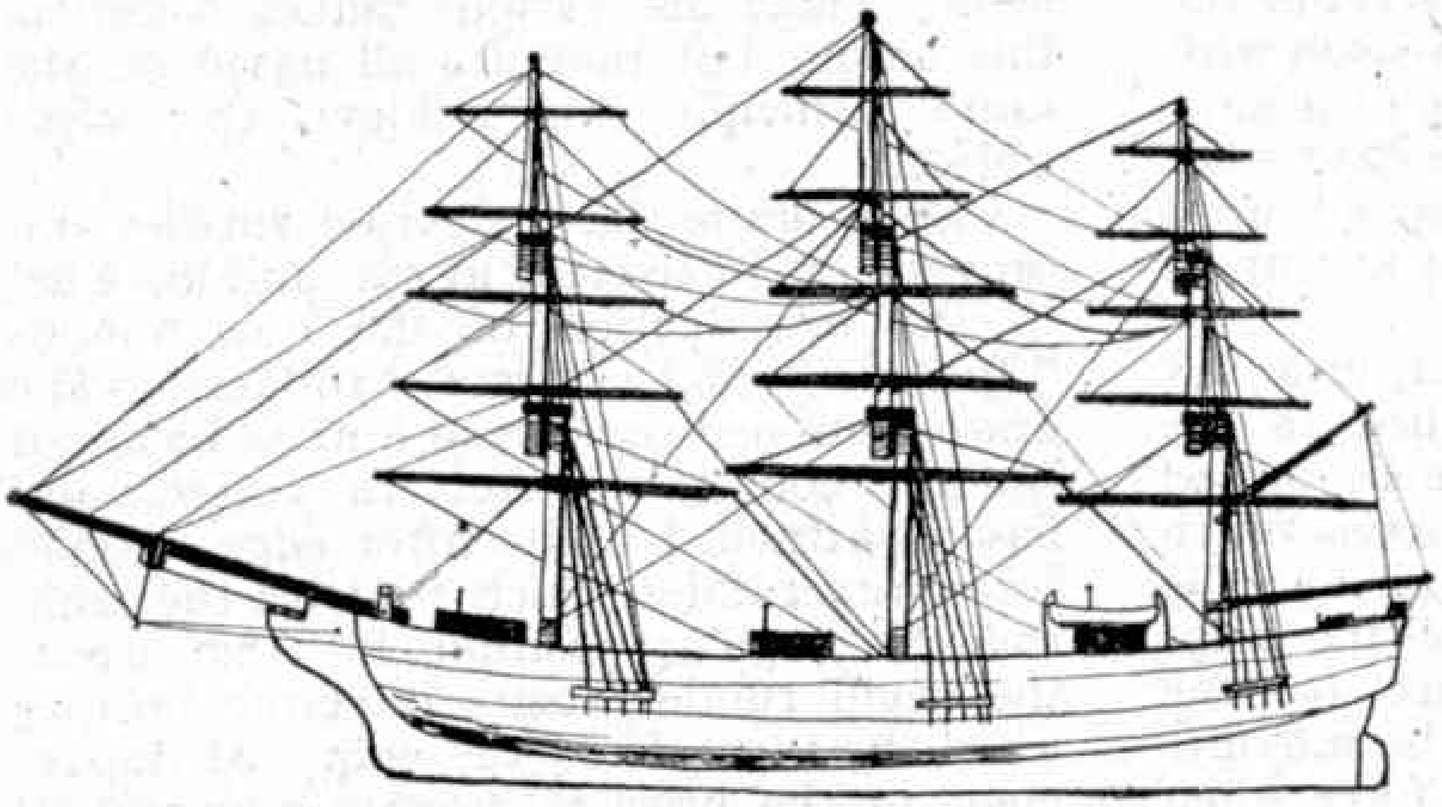
The Oertz rudder consists of two parts, a fixed forward part and a movable after part connected together. The principle is simple, the fixed forepart constantly keeping the ship on her course and the after part doing the necessary work to induce a change of direction. One of the advantages of this design is that the ship is very manœuvreable at slow speeds, and a further reason for its adoption by ship owners is that efficiency of operation of the vessel is increased by its use.

Next time you see a ship in your port or canal or steaming up the coast, remember all the thought and care which are being constantly put into improving that vital part—the rudder. Remember too, that the modern helmsman has a much easier job in steering his ship than his grandfather had when the simple type rudder was the best that the shipbuilder could provide.

A Sailing Ship from a Cigar Box

By E. G. Hobson

THE great handicap to the inexperienced builder of ship-models is the hull. Many of the building kits sold in peace-time have ready-shaped hulls, but more pleasure can be got from making one's model without such assistance. In describing this method of building a little sailing-ship model from a cigar-box, I am suggesting a built-up hull, with the foundation made in sections and planked on the outside like the real



The model sailing ship described in this article.

thing. It must be understood that no originality is claimed for this method. Every modeller has his own peculiarities; it is a very individual hobby, so I propose to broadly outline the process by which a start can be made. It is a mistake to be too ambitious at first; it only leads to disappointment. The "*Cutty Sark*" and the Spanish galleon can come later, and you will soon feel ready to tackle them, for the hobby has its own fascination.

For a start let us consider a simple three-masted ship of rather old design, with a "transom," that is to say, a flat stern. This does away with many of the difficulties of an elliptical stern, and is quite characteristic of the older type of "windjammers," especially coasters. Sailing ships are best to begin upon, as they give good pactice in fine detail; anyone who has made a good sailing-ship model will have little difficulty with a steamer.

Cigar-boxes are still fairly easy to obtain. The wood is easy to cut, does not split too easily, takes a nice finish, and if carefully fitted the result is really strong. It is always satisfying to have a model which one knows to be sturdily built, and though such things are not meant to be roughly handled, accidents happen and it is best to be prepared for them.

You should decide on a scale, because, even for a first attempt, a model which has some pretensions to scale building has more value, looks better, and enables one to determine proportions more easily in the later stages. Suppose the original of our model is to be 190 ft. long by 36 ft. beam, quite usual dimensions for a small merchantman of about 100 years ago. Then 24 ft. to the inch will be a convenient scale, and will make the hull 8 in. in length overall. That is a very good size to start with, small as it may seem; and from our cigar-box (the bottom for preference) it should be easy to cut with a fretsaw a piece of the shape shown in Fig. 1. Give it a good "sheer"; that is to say, have a nice sweeping line from bows to stern.

The two pieces A and B are cut out to expose the interior of the hull where the hatches come. This is not strictly necessary, but it does give a good appearance, and "visitors" are always intrigued by being able to see down the "hold. Our ship is flush-decked from stem to stern; forecastle and poop make a fine finish to later efforts, but at first they are very awkward things to shape properly, and may spoil the appearance if done badly.

The slots in the centre section have to be of the same width as the thickness of the wood, so that the sections are a firm fit without forcing when you start to assemble the frames. The sections are eight in number, the widest, of course, in the middle of the ship; and you should plan them out with some care, so that the planking, when laid on, will follow a smooth curve. The slots in the side of the sections are cut in the same way, so that the lower deck, made in two similar halves, can be fitted into them as shown. When the framing is finished it will appear as in Fig. 2, and after the stern has been fitted, and the separate parts all set up with a little glue, you will be able to start planking.

The sides of the cigar box make excellent planks, cut off edgeways, and it is surprising how thin and flexible you can get them with a little practice. This is the most tedious part of the work, but a good fretsaw works wonders, and though some of the planks will certainly be spoilt, those that survive will make the appearance of the completed ship well worth the labour expended. The planks are laid over the frames, with a little thin glue beneath them, and are held in place while the glue is setting with pins pushed through the planks into the frames. At this stage the model looks more like a pincushion than a ship (Fig. 3), but if you set it aside for 24 hours the pins can be withdrawn and the other side of the vessel planked.

A few remarks are necessary about this planking. At the bows and stern, where the sections are smaller, the planks will naturally lie closer together than on the broad amidships section, where there will be gaps. On a big model it is best to cut the planks to shape, so that they all face together exactly; but on an 8 in. model I have found it better to lay the planks with a slight overlap at the ends, and then to close up the gaps amidships by cutting a few planks with tapered ends, springing them into the spaces, and holding them with glue (A, Fig. 3).

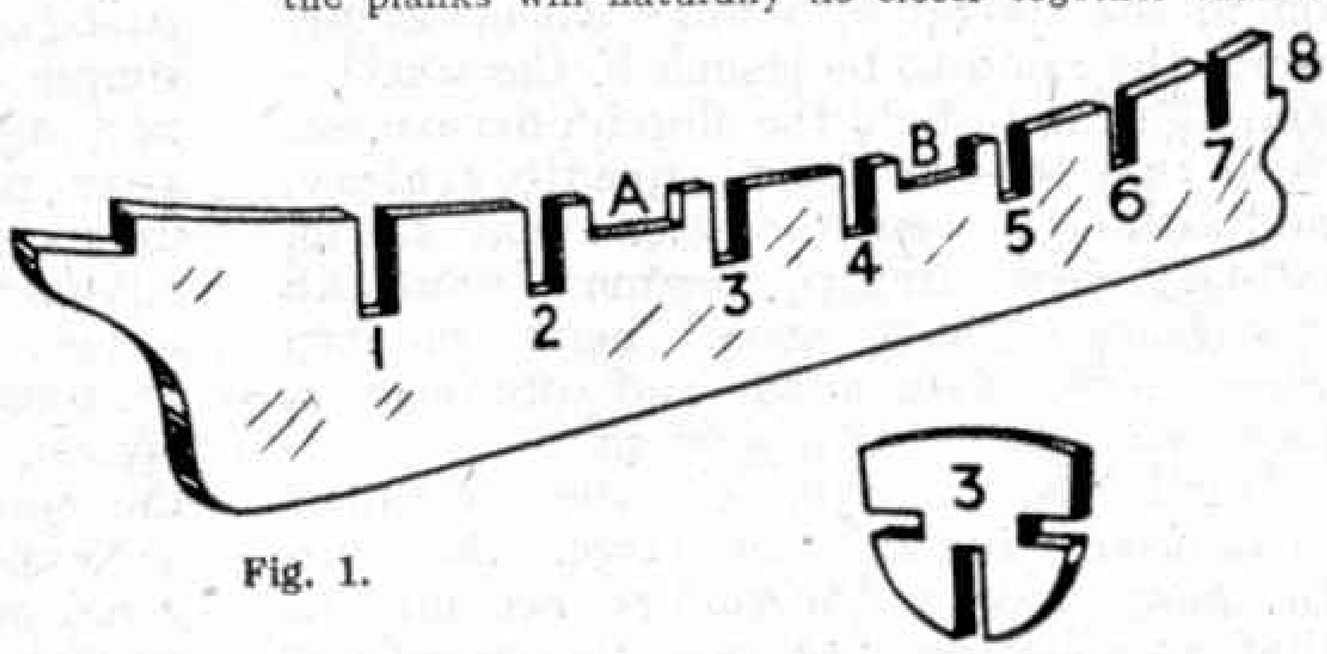


Fig. 1.

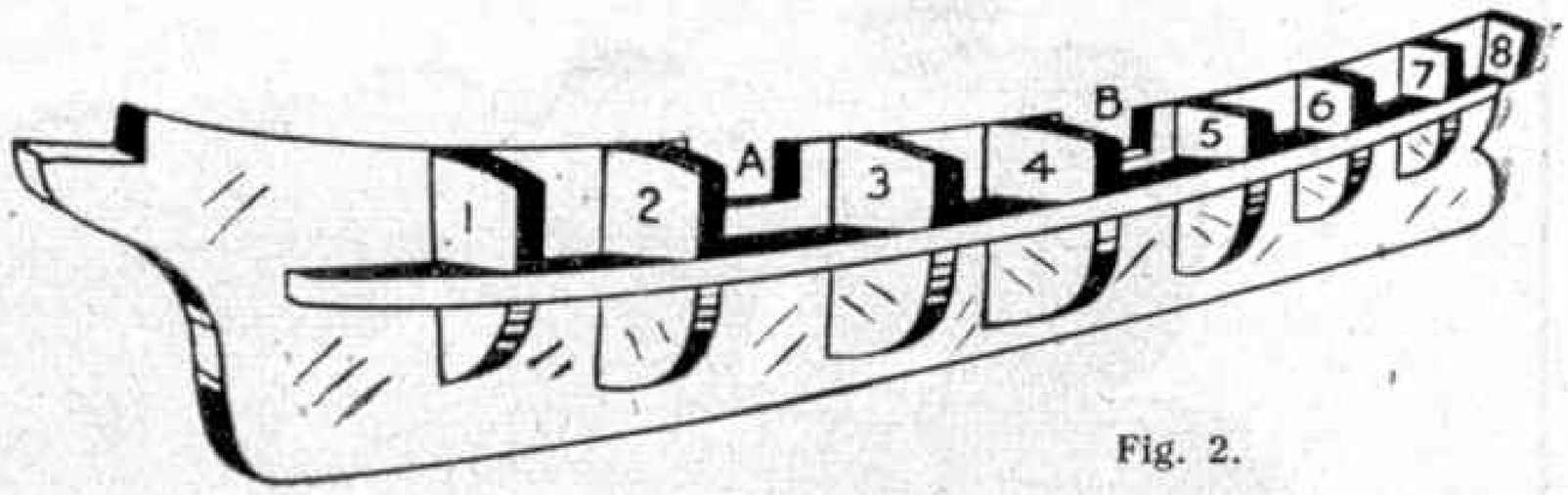


Fig. 2.

This is not strictly correct practice, but if neatly done on a small model it is very hard to tell from the real thing. The planks are very flexible, and after you have laid the decks, plank to plank, in the same way, you can easily curve the top plank, the bulwarks, into the necessary "sheer." Any gaps in the decks and ship's sides can be closed up with fine splinters of scrap wood, of which you will by now have no lack!

Fig. 4 is a plan of the deck when planked. The hatches A and B come over the recesses A and B shown in Fig. 1. They can be framed with matchsticks, their contrasting light colour looking well against the darker planking; or if you like, the whole deck could be planked with the thin, flat spills sold by many tobacconists for a penny or two a bundle. These are often very smooth and of a uniform thickness. They, too, will follow the "sheer." There are three deckhouses, C, D, and E. With a little trouble these can be made "eggshell" fashion, out of waste bits of the planking, but if you do not want to go to that trouble they can be solid wood blocks. C is where the crew live; D is the cook's galley; E is the "half-deck" for the apprentices, and this carries two lifeboats, which can be cut out of the solid wood, or cast in plastic wood, or bought ready-made if you are lucky enough to find a model shop still selling small ones. I like to shape mine from the solid wood, and they do not need much trouble to complete. Bent pins with the heads clipped off make good davits, F is the cabin skylight, which can be "glazed" with cellophane if you have the patience, or otherwise can just be a wooden wafer. G is the steering wheel, for which a small cog-wheel taken from an old watch is ideal; it can be glued to a little block of wood.

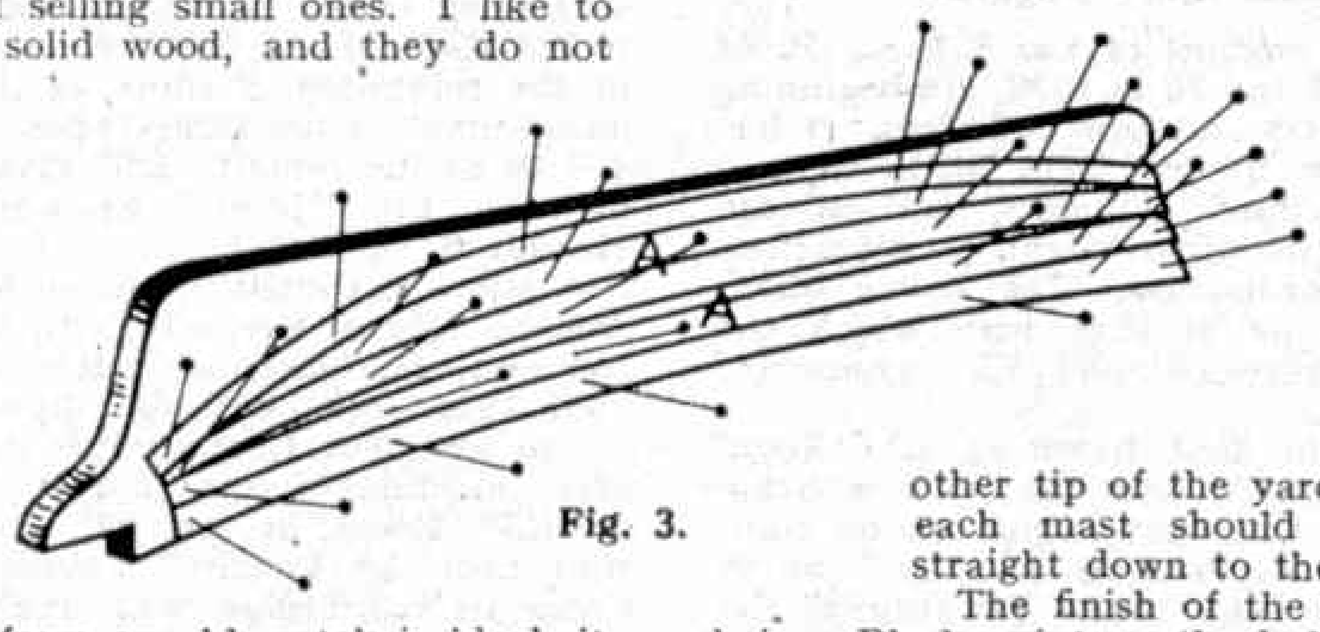


Fig. 3.

When the outside of the hull has been well rubbed with sandpaper, you will be able to start rigging; the masts are marked "M" in Fig. 4. It is impossible to give full details of this without a proper plan. Many dictionaries and encyclopædias have a drawing of a full-rigged ship, or a barque, all ready for you to use, and many pictures of sailing ships show the principal ropes. It is not necessary to include all of them; in fact you could not do it on a small model. I have drawn a plan of rigging suitable for this model, and this is shown in the upper illustration on the previous page. The masts are each in three sections, and can be made out of very large matches, rounded with sandpaper, and glued together so that the upper mast, where it overlaps the lower one, faces forward. The shrouds are taken down outside the hull and tied to pins, then secured to the sides of the ship with glue. When this is dry, pull out the pins and cut off the waste ends. Any good thread, not too thick, will do, but "Silko" is the best of all if you are able to get some. The "dolphin-striker," under the bowsprit, is another headless pin. The bowsprit is made in two parts, and like the masts, it fits into a hole carefully drilled into the centre-section, and filled with glue before inserting, to hold it firmly.

Matches, tapered at the ends, make excellent spars; they can be lashed to the masts with cotton or "Silko," and further held with a dab of glue. Do not forget that they grow shorter as one leaves the deck; the lowest is the longest, and can be a bit wider than the ship. In the case of the masts, the foremast is shorter than the mainmast, and the mizen mast shorter than the fore. Set up your rigging carefully, without strain, and get the stays at an even tension, if possible, so that none are slack while others are too tight. The braces can be added afterwards. On a real ship they ran from the ends of the yards, through blocks on the masts, down to the deck, but in a model of this size they look well enough if just taken from the tip of each yard, passed round the mast, and led to the other tip of the yard. The lower yard on each mast should have its braces led straight down to the deck.

The finish of the model is a matter of choice. Black paint on the hull with a red waterline is strictly correct, especially with a row of painted white ports, but one has to be a fairly skilled painter if the results are not to look cheap and tawdry. When using cigar-box wood in this way I think the best results are obtained, after the unwanted bits of thread have all been removed, and the planks well sandpapered, by simply varnishing the model all over with a clear copal varnish. This leaves the wood its natural colour, but gives high lights to the model and a pleasant golden-yellow tinge to the masts and deck that is very satisfying, and far better than a nicely-planked ship in which the detail of one's labour is hidden by paint.

The lid of the cigar-box can be cut down to a neat baseboard with two "chocks" to grip the keel of the model, and this, too, could be varnished.

The result will probably be better than you at first expected, and, in any case, you will have gained experience and ideas for your future attempts in this fascinating hobby. For, if you really *complete* your first model, so that you can say to yourself "I built that!" . . you will soon want to start another one! One always does!

By the way, assorted sizes of flat wooden spills are still on sale. If the best are selected, the whole model could be planked with them, avoiding the most tedious part of the work altogether. Their natural colour is effective.

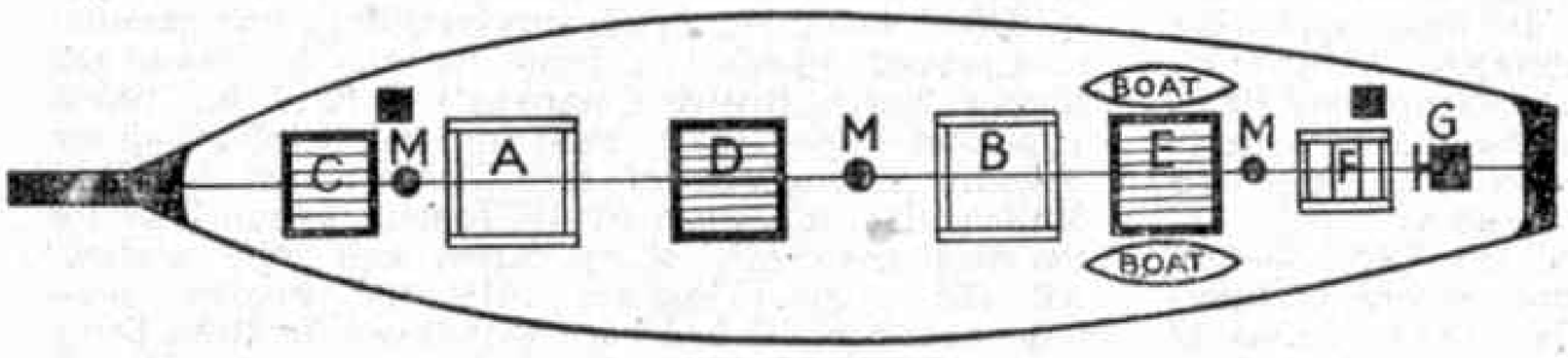
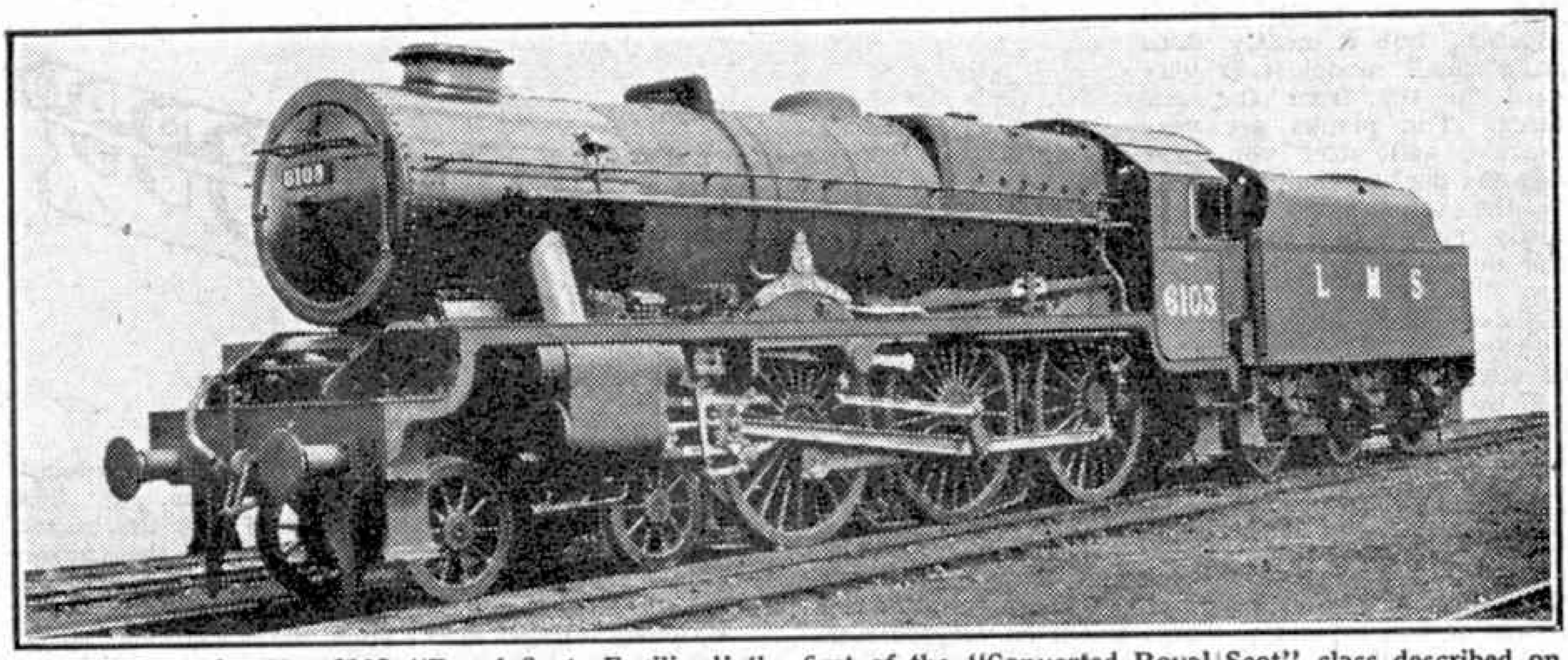


Fig. 4.



L.M.S. locomotive No. 6103 "Royal Scots Fusilier," the first of the "Converted Royal Scot" class described on this page. Photograph by courtesy of the L.M.S.

Railway News

Re-built "Royal Scot" Engines

Many "Royal Scot" engines of the L.M.S., 50 of which were built in 1927 and 20 in 1930, are beginning to fall due for new boilers and new cylinders. It has been decided therefore to fit them with tapered boilers and newly designed cylinders, and at the same time to carry out other slight modifications with a view to standardisation. The boiler which will be used is the same as that with which the "Jubilee" class 4–6–0 three-cylinder 5X engines are being re-boilered.

The conversion of the first batch of 20 "Royal Scots" has been authorised, and the work is being carried out at Crewe. The first engine to be completed was No. 6103 "*Royal Scots Fusilier*," which was put into traffic in June 1943. Eventually, the whole of the class will be dealt with in a similar manner. The re-built engines will be known as the "Converted Royal Scot" class.

The accompanying photograph of No. 6103 shows the general appearance of the rebuilt engines. The principal dimensions that are altered are the heating surfaces, now 1,667 sq. ft., 195 sq. ft. and 357 sq. ft. for tubes, fire-box and superheater respectively, and the weight. In full working order the rebuilt engine weighs 83 tons, a decrease of 1 ton 18 cwt. and the total weight of engine and tender is 137 tons 13 cwt.

A "Sleeper" Anniversary

On 1st October it was 70 years since the first sleeping car train steamed out of Euston on its way to Scotland. The upper sleeping berths of 1872 were like rigid hammocks, the day seats forming the lower berths. Sleepers were then for 1st class passengers only, and it was not until 1928 that 3rd class sleepers made their appearance.

L.N.E.R. Locomotive Notes

In our February 1943 issue we illustrated the streamlined "Pacific" No. 4901 as then appearing in the latest style lettering and renamed "*Charles H. Newton.*" Since then, however, the company's Chief General Manager has received the honour of knighthood, and so No. 4901 has also been "knighted" and now bears the name "*Sir Charles Newton.*"

Further conversions from "A1" to "A3" 4–6–2s with 220 lb. per sq. in. pressure, enlarged superheater and 19 in. cylinders, are No. 2553 "*Prince of Wales*" and No. 2576 "*The White Knight.*" The latter for some time was fitted with the A.C.F.I. feed water heater. Some additional 0–6–0 and 4–4–0 engines of former Great Northern origin have been drafted to the Midland and Great Northern section on account of the scrapping of more of that Joint Committee's locomotives of the same types. Former Great Central 4–4–0s of the rebuilt "D9" class are also seen a good deal on the "Joint," as well as ex-G.E. "Claud Hamilton" 4–4–0s.

A stir was caused in the vicinity of the small East Anglian city of Ely, which is, however, an important junction, one morning lately when streamliner No. 4487 "*Sea Eagle*" was seen approaching "light engine," on an ex-Great Eastern line which does not usually carry anything larger than a "Sandringham" 4–6–0, a "K3" 2–6–0, or an "02" 2–8–0. The reason was that the "A4 Pacific," having worked from King's Cross to Cambridge was unable to turn there on account of repairs to the 70 ft. turntable and so had to be turned by means of the Ely triangle.

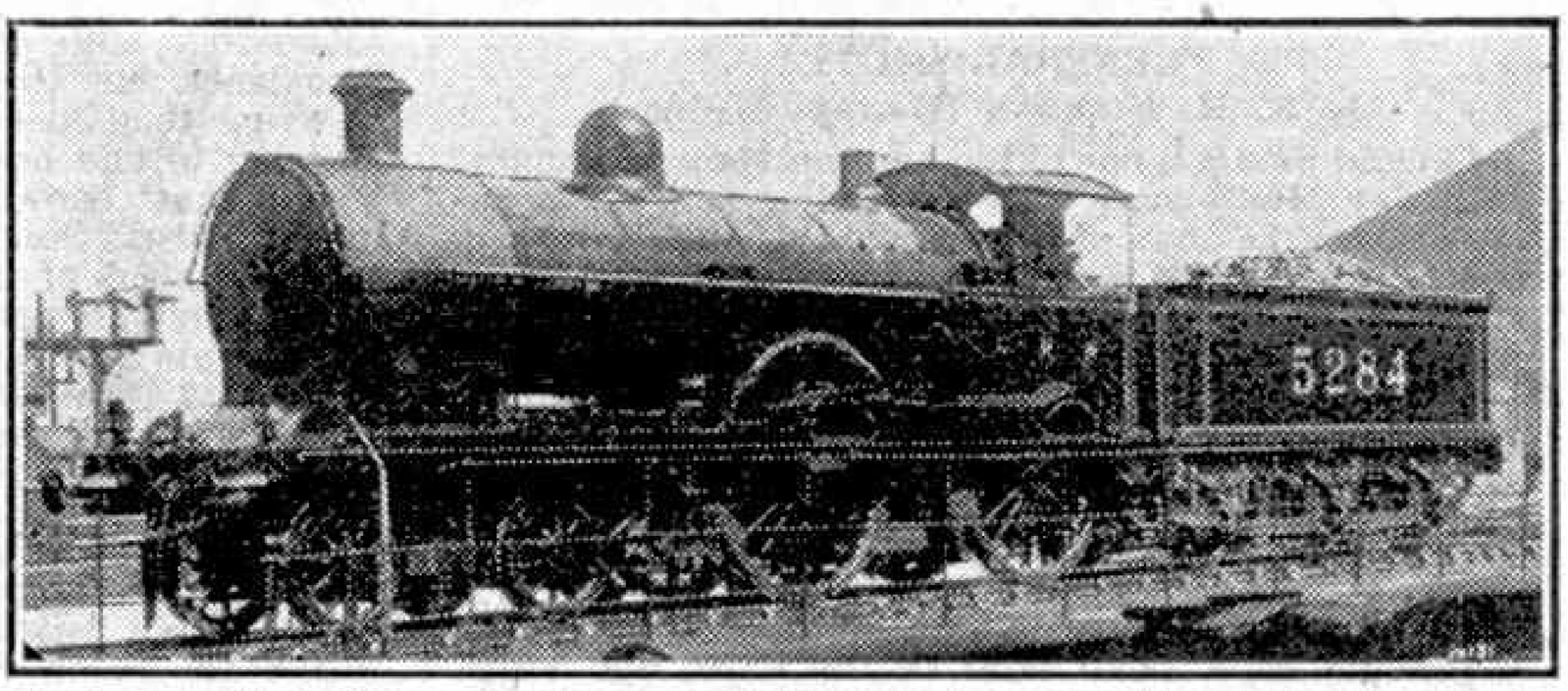
Only two of the "D13" G.E. 4–4–0 rebuilds now remain. These are Nos. 8023/39. After completing trial express runs on the East Anglian main lines new 4–6–0 No. 8302 "*Eland*" was allocated to Norwich. A number of "express" coal, goods and empties trains is being run regularly between Peterborough and Ferme Park Sidings, four miles from King's Cross, hauled by British austerity W.D. 2–8–0s. A new series of these, numbered from 7060 up, is appearing from the works of the Vulcan Foundry Ltd. Veteran 4–4–0s that are among the survivors of the former North Eastern "M1" and "Q" classes, with 7 ft. 1 in. driving wheels, are still seen on Newcastle-Alnwick passenger trains, including No. 1621, which made the record run from Newcastle to Edinburgh on the fastest night of the race to Aberdeen in 1895. No. 6401 "*James Fitzjames*" is the last of the 24 Scottish "Director" class 4–4–0s built to the order of the L.N.E.R. in 1924 for service in Scotland as class "D11/2," and has recently been transferred to the unaccustomed haunts of Leeds, N.E. area.

"D36" 4–4–0 No. 9695, survived until last summer in a rebuilt superheated form. It was the last of the former North British Company's 5 ft. 7 in. "West Highland bogie" class, built in 1894–6 following the opening throughout of the Glasgow-Fort William-Mallaig line, renowned for its scenery as much as for its steep gradients, sharp curves and wild location. All the original engines with the smaller, non-superheater boiler had been withdrawn by 1924, being replaced by the larger 6 ft. superheated "Glens," now largely superseded by Gresley 2-6-0 types.

Only Four of Each Left!

We are informed that only four of each of the once numerous 4-4-0 "Precursor" and "George the Fifth" classes of the former London and North Western Railway now remain on the L.M.S. active list. The rebuilt "Precursors" still about are Nos. 25277, 25292, 25297 and 25304, named respectively *"Oberon," "Medusa," "Sirocco"* and *"Greyhound"*; the four "Georges" are Nos. 25321, 25350, 25373 and 25376, of which the first is named *"Lord Loch,"* and the third and fourth are respectively *"Ptarmigan* and *"Snipe,"* No. 25350 was *"India"* until that name was given to "Jubilee" class 4-6-0 No. 5574, so it is now nameless.

Not long ago a representative, now scrapped, of the "George the Fifth" class, once pre-eminent among express engines, gave a fast, non-stop run from Bletchley to Northampton in 22 min. for the 19 miles. Time regained was 3 min. and the slow lines were used to Roade Junction. The load was four bogies and van, 140 tons, and maxima of 67–68 m.p.h. were twice attained, with a minimum of 55 on the 1 in 330 up to Roade.



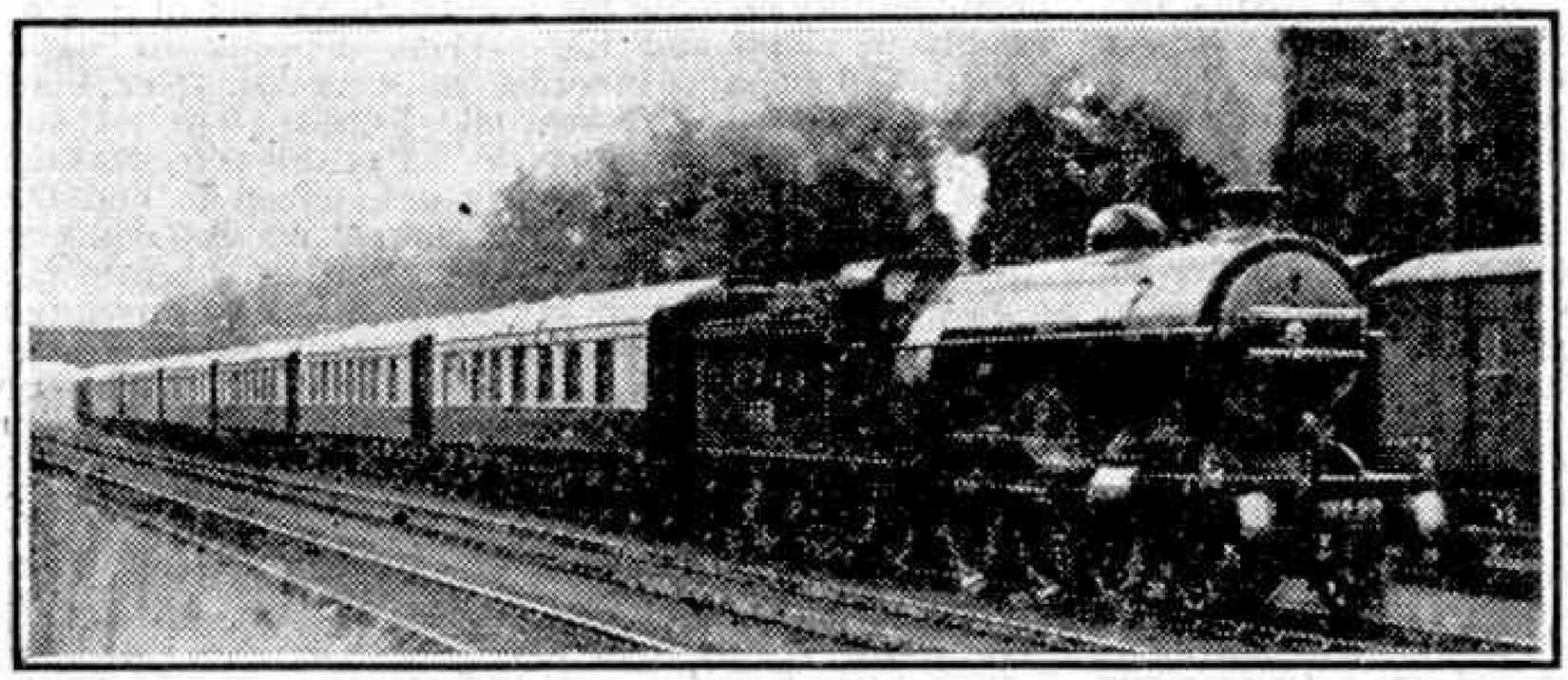
Former L.N.W. "Precursor" class 4-4-0 "Ambassador," as rebuilt and renumbered by the L.M.S.R. This is now withdrawn, and only four rebuilt "Precursors" remain on the active list.

A G.N. "Atlantic" Withdrawn

The news that one of the "newest" Ivatt "Atlantics" has been scrapped came as a shock to many enthusiasts in August last. Apart from the non-standard compound No. 3292, withdrawn in 1927, the whole family of 92 "C1's" has remained intact for almost 33 years, that is since 1910, when the last 10, superheated and modified, appeared. It is one of this final series, No. 4459, which is the first victim, presumably on account of reaching works in such bad condition that repair or major renewal was not justified in present conditions. One fears that it may be the thin end of the wedge!

As G.N. No. 1459 and subsequently L.N.E.R. No. 4459, she was always shedded at King's Cross and was a most consistent performer, seldom giving any trouble. During her first years, in the hands of the lively driver Tom Rowley, she demonstrated the advantages of superheated steam, piston valves and larger cylinders both in uphill and downhill running, although boiler pressure was temporarily reduced to 150 lb. per sq. in. In 1923 with Driver Redding, she worked the invitation and inaugural public runs of the *"Harrogate Pullman"* with time in hand on the new 54 m.p.h. booking between London and Leeds. Between 1925 and 1937 she was employed successfully for long periods in the "Pullman Link," usually as Driver Jack Holland's engine. Scheduled speeds rose to 57–58 m.p.h. overall on the 175¾–185¾ mile non-stop runs between King's Cross and the West Riding, with loads averaging about 300 tons. Although No. 4459 did not happen to figure in any of the most spectacular recoveries of lost time, she must in the aggregate have made up many hours and travelled tens of thousands of miles on those long, fast journeys alone. During the present war she was fitted with experimental A.T.C. apparatus in connection with a length of track so equipped in the suburbs and regularly worked the 5.50 a.m. slow train from King's Cross to Cambridge, returning with the 10.13 a.m. express, now 10.25 a.m.

Thanks to Gresley modernisation, and to keeping in a good state of maintenance, it was in the early 1930s that the G.N. "Atlantics," although 20–30 years old, did much of their most outstanding work as regards both speed and load haulage. Many of them always seemed ready to create new records by performances that would have done credit to a modern 4-6-0. The story of these famous engines was told by Mr. R. A. H. Weight in the April 1941 issue of the *"M.M."*



King's Cross-Harrogate Pullman express hauled by Ivatt "Atlantic" No. 1459 of the former G.N.R. After grouping the engine was renumbered 4459 and is now withdrawn. Photograph by courtesy of the L.N.E.R.

Four Years of War

In the four war years British railways have broken all records in transport achievements. They have moved over 1,000 million tons of freights and run 180,000 special trains for the transport of troops and equipment. Everywhere services have been maintained in spite of enemy action and the many difficulties inseparable from war conditions. The number of passengers carried, a large proportion of them Services personnel, is 50 per cent more than in 1939, although ordinary passenger services have had to be cut by nearly 30 per cent., so that lengthy trains and some overcrowding are inevitable. Among vast freight movements, the railways this autumn handled the largest grain traffic ever experienced, following busy months of fruit transport, and now the sugar beet activity is getting to its height. All the while, other foodstuffs and raw materials, armaments and military supplies of every kind are being conveyed in many thousands of tons daily.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d. for postage.

"GENERAL SMUTS"

By R. H. KIERNAN (Harrap. 5/- net)

General Smuts is one of the most outstanding figures of to-day. He is more than the leading South African statesman; he has been summoned to the inner councils of the Allies in this conflict as well as in the last, and he has won fame in war, politics and philosophy. With all these solid achievements there has always been a touch of romance in him, shown at its height in dashing exploits in the South African war of more than 40 years ago. Such a figure demands a good life story, and Mr. Kiernan has pictured this great figure for us in a book that will be greatly appreciated, especially by older readers of the '*M.M.*'

Field-Marshal Smuts, to give him his present title, began life on a small farm in the Cape, and until he was 12 he spoke only Afrikaans and could not read or write. When he did go to school he soon showed extraordinary ability, and eventually he became a lawyer for whom a brilliant career seemed certain. Then he left the Cape for the Boer Transvaal Republic, and when the war against the British broke out he emerged at length as a daring leader of guerilla raiders, a remarkable change from his law work. At the head of a small force of mounted men he carried the war into the Cape itself, and he was still there, skilfully maintaining a difficult position in the heart of the enemy's stronghold, when he was called to the conference that brought the war to an end.

So far Smuts had been Britain's enemy, but the fair dealing and trust that followed won his confidence and loyalty, and with his leader General Botha, he not only held South Africa for the Empire when the Great War broke out in 1914, but took part in the campaigns that won German South-West Africa and Tanganyika territory. This in itself would have been great work for most men. For Smuts it was only the beginning of his contribution to the Allied war effort, for he came to Great Britain as a member of the British War cabinet, and had a large share in the stirring events that ended the conflict. Then he went on from strength to strength, always serving his ideals of freedom within the British Commonwealth of nations, a fine descriptive phrase that he originated.

The last sections of the book are taken up with more recent events. Smuts foresaw the outcome of the troubled times prior to the outbreak of war, and when the storm burst he brought South Africa into line with the rest of the Empire. We all know how magnificently South African troops contributed to the freeing of Africa from Fascist domination, and just as they have taken part in war activities in the field, so Smuts himself has been summoned as a great soldier and a far-sighted organiser to help in the making of plans.

The book is illustrated by a portrait and six full page plates, with maps illustrating Smuts' two great campaigns.

"AIR TRAINING MANUAL"

(Odhams Press Limited. 7/6 net)

There is nothing to-day so interesting to boys and young men as flying. Practically all are familiar with silhouettes and characteristic features of famous aeroplanes, but they know that there is much more in flying than knowledge of this kind. It is indeed amazing to find how much the would-be flyer in the R.A.F. must know. Every phase of the air war has its specialists, from pilots to armourers, riggers and other members of the ground staff, but all concerned must know something of aero engines, aircraft instruments and wireless and electrical equipment; they must be familiar with the general construction of machines and understand the principles of soaring and gliding as well as flying under power; and of course navigation and meteorology, or weather knowledge, are of the greatest importance.

This sounds a formidable list of subjects, but it is certainly not beyond the average boy and is well within the reach of all who are really keen. For them this manual provides a really valuable course. It is intended chiefly for those who are about to join the A.T.C., but also will be a valuable source of reference to those already enrolled. In fact any air-minded youngster would be delighted with it. It begins with a section on the easy but necessary mathematics, and continues with others covering the various topics already outlined. Each section is the work of an expert, who understands how to put his knowledge into clear and simple language so that it can be grasped by the youthful reader, and diagrams have been added wherever they seem likely to be helpful. The total number of these in the book is 377.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"ADVENTURE IN STARLIGHT"

By C. A. GEDGE (Harrap. 6/- net)

This thrilling story is concerned with efforts to find deposits of a rare metal, the use of which would considerably increase the penetrating power of searchlights in cloud and fog. These deposits are on a Pacific island and in order to secure samples Fred Hanbury and his 16-year old brother Ron set out in their flying boat "*Starlight.*" But this is in wartime and the Germans are equally determined to find the deposits. The result is many excitements and dangers, beginning with efforts to steal "*Starlight*" before the start of the expedition and to shoot it down over the Atlantic, and ending in furious fights on the island itself. How the Hanburys triumph makes up a very fine story. The book has a coloured frontispiece.

"CAMOUFLAGE '14 - '18 AIRCRAFT"

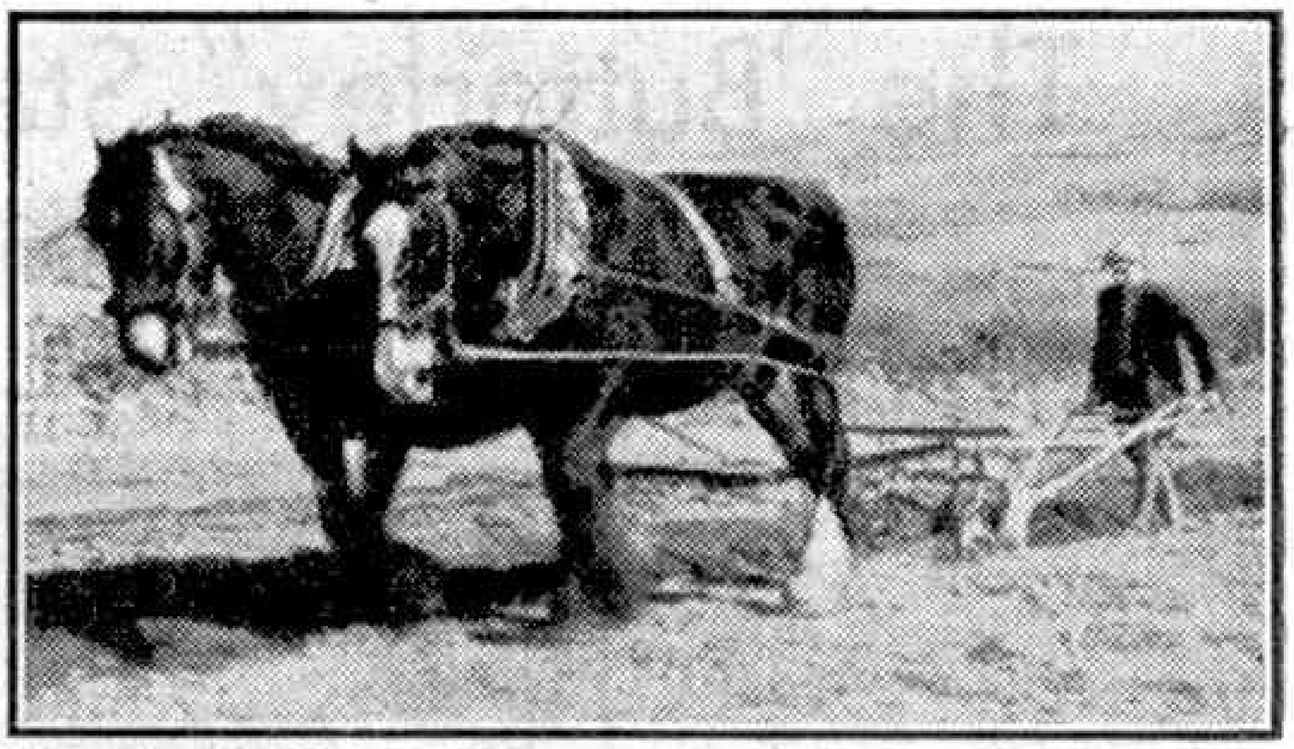
By O. G. THETFORD

(Harborough Publishing Co. Ltd. 3/6 net)

At present the interest of aeroplane model-builders naturally is directed mainly to military aircraft. This interest is not limited to current machines, however, and information in regard to those employed by both the Allies and the enemy in the 1914–18 war is in great demand. This excellent handbook gives the model-builder all the data he is likely to need in regard to the camouflage schemes and squadron markings of the Royal Flying Corps machines of those days, and in lesser degree it deals also with the Service markings of the American, French, Italian, and German military aircraft of that war. It is lavishly illustrated in line half-tone and colour.

Photography

Having Something to Show



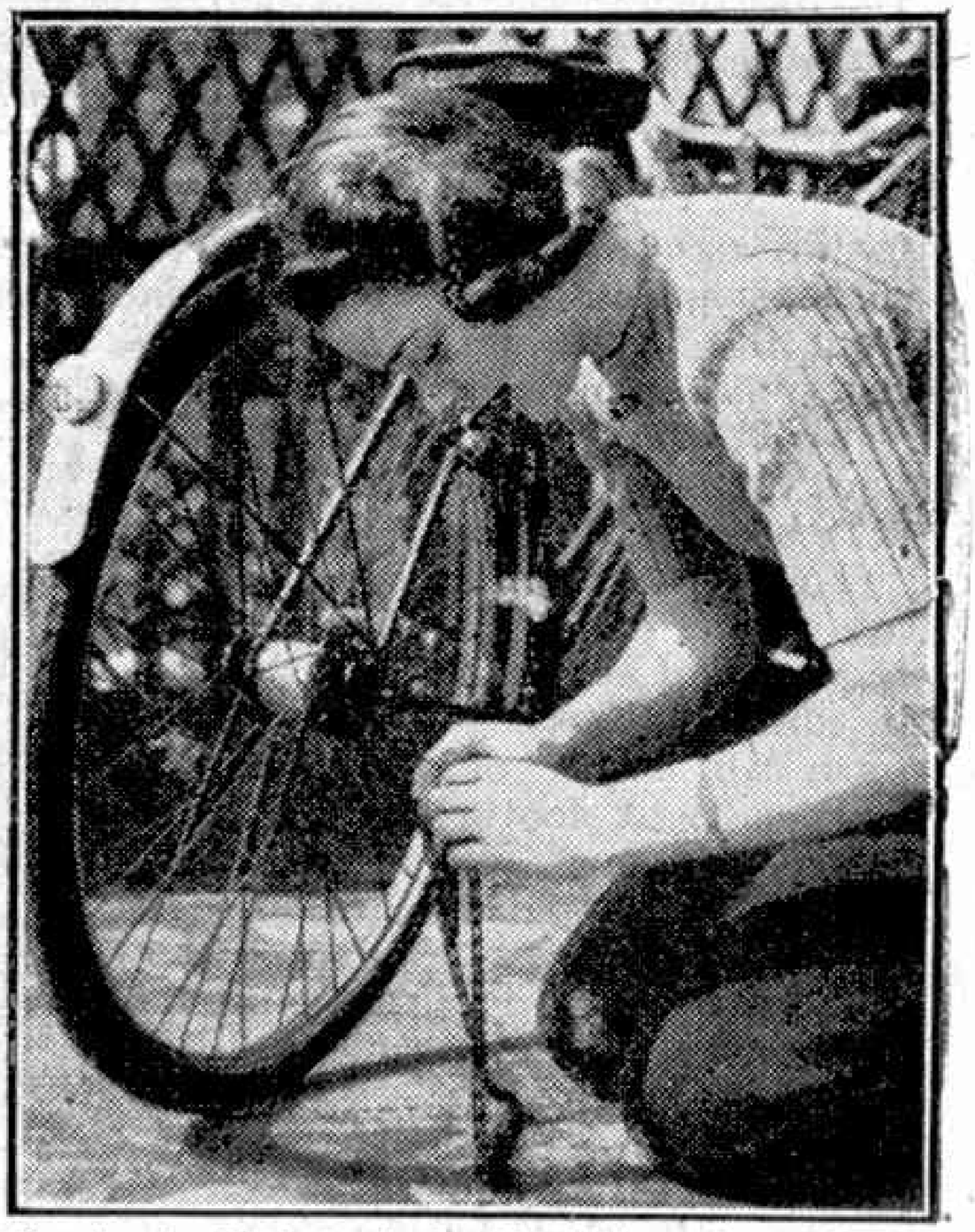
Ploughing in Wales. Photograph by J. E. Martin, Wichenford.

MOST of us know boys who at one time took up photography with great enthusiasm, but have since lost all their keenness. There may be many reasons for this change, but the commonest one is that they have nothing to show for their efforts. They made a few prints from their negatives, gave some of them away, and left the rest lying about loose to get dirty, crumpled and useless. The result was bound to be loss of interest. The only photographers who get real and lasting fun out of their hobby are those who carefully preserve in an album a good print from each successful negative. These boys always have something to show their friends, and each print serves as a reminder of some happy outing or incident.

The Windmill. Photograph by C. A. Reader, Guildford.

I strongly advise every reader who has prints scattered about in odd places to collect them, and put them in some sort of order. In normal times this is best done by mounting them in an album; but albums are almost impossible to get just now. The alternative I recommend is to mount the prints on sheets of stiff paper, and keep these sheets in a spring-back binder of the type used for the "*M.M.*" It is true that good paper is scarce, but with a little trouble it will be possible to find something suitable. Brown paper, for instance, makes quite a good mount, and some of this can usually be found. If a binder is not available the sheets can be fastened with paper clips; or a sister or somebody can be persuaded to stitch them together in the form of a book. If this last method is adopted, each book should be limited to the number of sheets that can be stitched without difficulty.

The main thing is to make a collection of one's prints so as to have "*Something to Show.*"

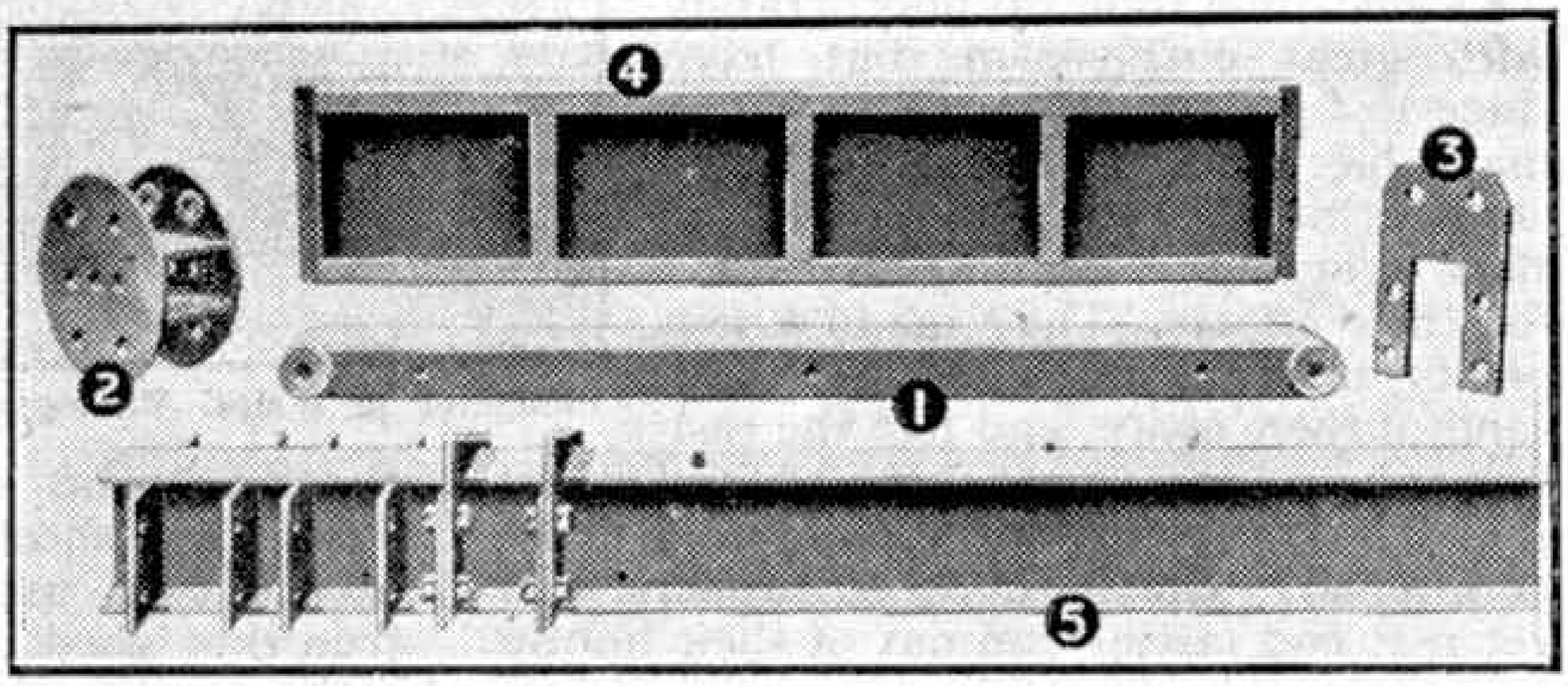


Overhaul. Photograph by R. Atkins, Jnr., Monton.

The "Butterley" Standard Bridge

A 270 Ft. Structure Built in 120 Hours

THE Butterley standard bridge is of particular interest to Meccano model-builders on account of its use of interchangeable standard parts. The system is designed for the rapid erection of temporary or permanent bridges. It employs only five standardised units, which are shown in Fig. 1. Of these units, 1 is a welded box girder used to form all chord and diagonal members; 2 is a circular drum or bobbin for intersection points; 3 is a cross girder suspension plate; 4 is a floor plate seen from the underside, and 5, a cross girder unit with three sets of wing plates, showing how the suspension plates are attached.

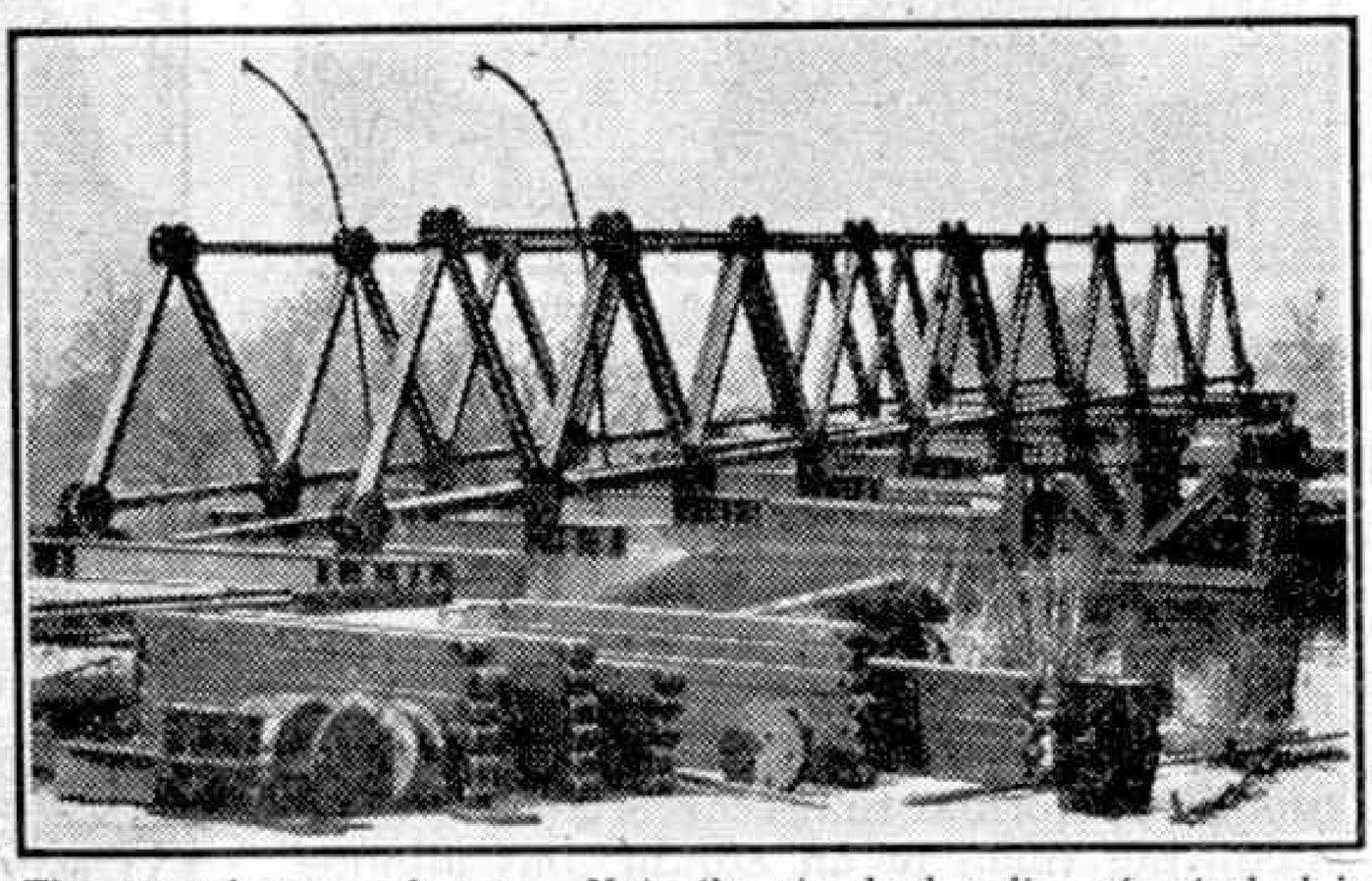


The five components of the Butterley Standard Unit Bridge. Photographs by courtesy of the Butterley Co. Ltd., Derby.

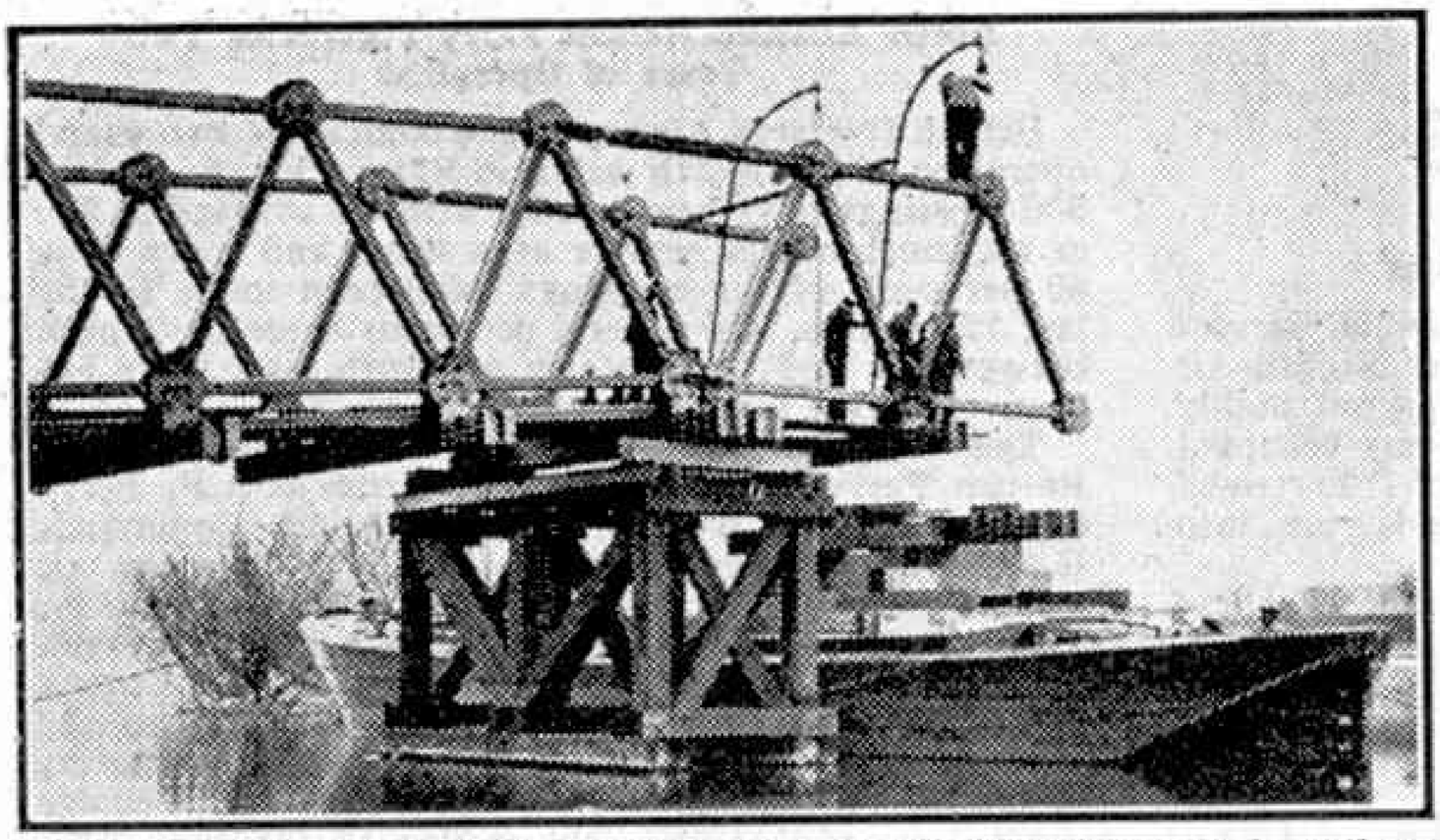
These five members, which are made on jigs to a high standard of accuracy, are used in different arrangements to form all types of structure from a light footbridge to a heavy bridge of 150 ft. single span. All the parts are easily handled with light appliances, and there is no riveting to be done either in the production stages or on the site.

The best way to show how the Butterley system operates is to describe briefly the construction of a bridge that was urgently required recently across a British waterway. This bridge consists of three spans of 90 ft. single-girder, single-tier construction, to carry lorries up to 14 tons weight. The time taken in erection, after the materials were delivered to each shore edge and the abutments and piers were in position, was only 120 hours. This short time was not achieved by the employment of a large number of erectors—in actual fact only nine men and two boys carried out

The wooden piers erected; each of six piles 14 in. by 14 in. suitably braced.



The second approach span. Note the standard unit parts stacked in the foreground.



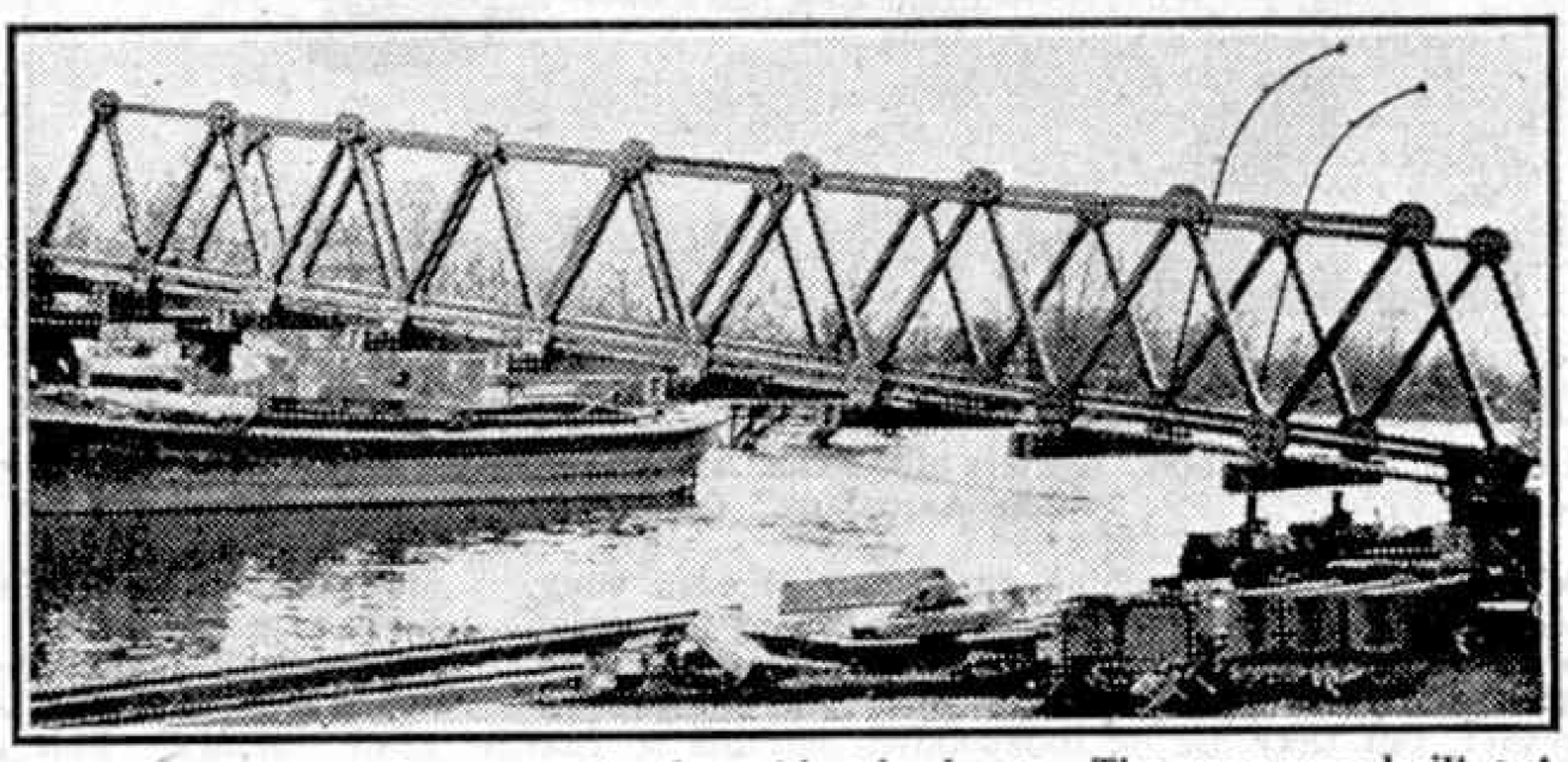
Starting the building of the centre span by cantilevering out in halves from the piers.

the whole work from start to finish.

Two concrete abutments were first made, and then two piers were driven and erected, each consisting of six timber piles 14 in. by 14 in., suitably braced and having steel channel supports fixed at the top to receive the steel superstructure. The road access to the bridge was from one side of the river only, so that one half of the superstructure material had to be transported across the river.

The approach spans have a gradient of 1 in 11.25 to allow 12 ft. clear head room under the centre span to permit river traffic to pass below; and, as the working space on shore was 20 ft. only, the launching of the completed spans in the normal way was not practicable. It was therefore necessary to build a portion of the bridge on shore. Then, as the erection proceeded, the pier end was placed on a barge, and as additional units were erected to the girders at the shore end, the barge and steelwork were moved out into the stream nearer to the pier until 90 ft. of the bridge was completed and lowered on to the abutments and piers.

The 90 ft. centre was cantilevered out in halves from the approach spans, and the halves were joined at mid centre-span. Temporary ties with screw adjustment were attached to the top chord over the piers to support each cantilevered portion during erection. Fine adjustment of the screws made possible the joining of the halves of the centre span by means of standard pins, which are a feature of the design. When the centre span had been joined, the temporary ties on the top chords were removed, thus making each span independent.



One of the approach spans after launching by barge. The span was built out from the bank, resting on the barge, which was moved nearer to the piers as bridge units were built-up on shore.

Expansion is provided for on the piers by machined steel bars that allow one end of each span to slide as required.

The weight of the steelwork in each span of 90 ft. is 30 tons, and the manufacturing time at the works for all the steelwork of the bridge was only three weeks. The employment of welded construction of a high degree of

(Cont. on page 394)

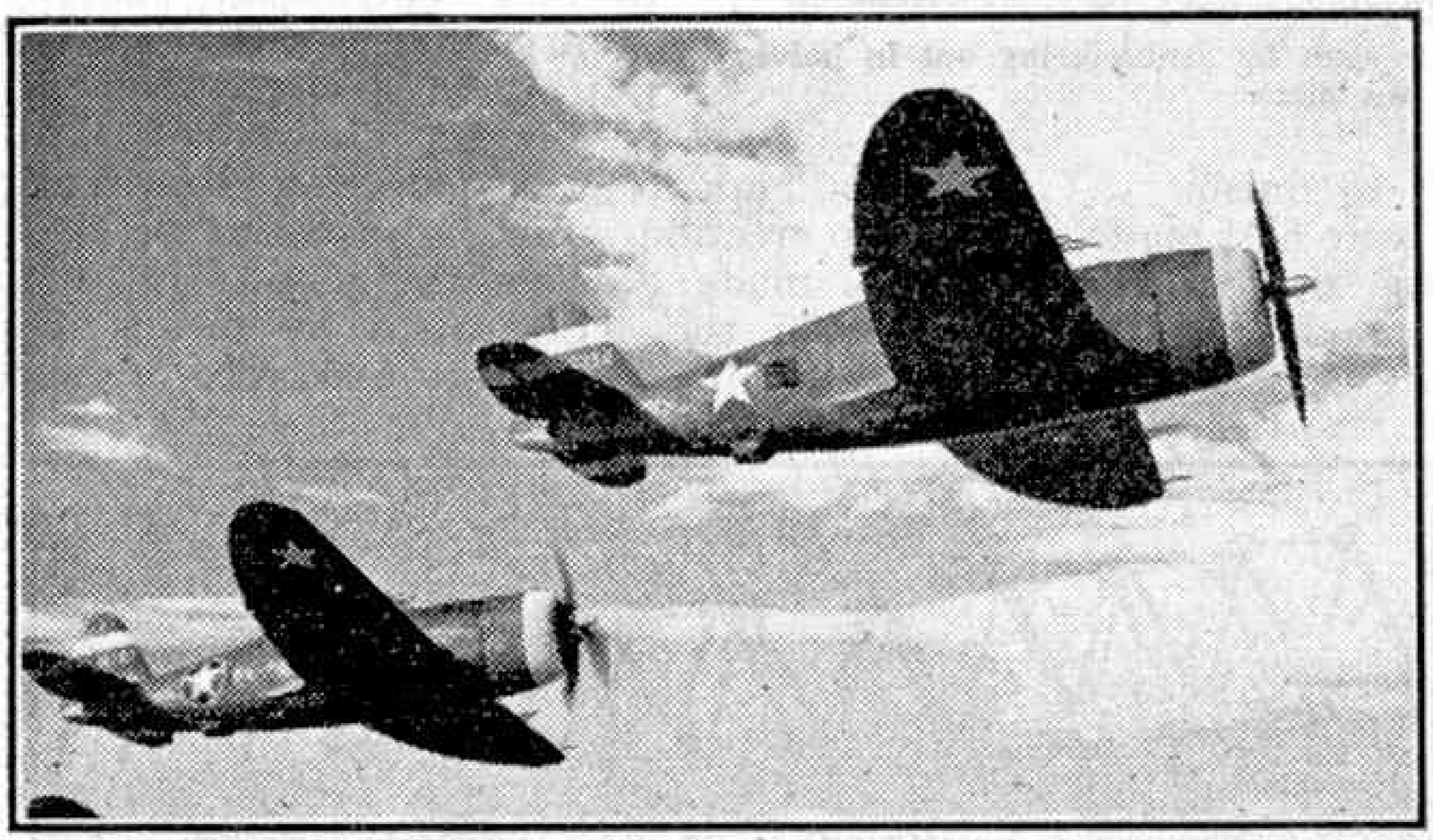
The bridge completed ready to carry 14-ton lorries.

Air News

Republic "Thunderbolt" Fighter

The Republic "Thunderbolt" fighters in service with Fighter Command of the U.S. Army Eighth Air Force have been doing fine work, carrying out highly successful offensive sweeps over enemy-occupied territory and escorting big formations of "Fortress" heavy bombers on great daylight raids far into Germany.

The photograph on this page shows two of these machines in flight. The "Thunderbolt" is the largest, heaviest, and one of the fastest single-seat, single-engined fighter aircraft in service. It is armed with eight 0.5 in. machine guns, four in each wing, with three of them projecting in staggered formation and the fourth one flush with the wing leading edge. The guns are operated electrically, and all fire together, but they are on independent circuits so that if one gun fails it does not put the others out of action.



Republic "Thunderbolt" fighters of the U.S. Army Eighth Air Force. Photograph "The Aeroplane" Copyright.

"Lancaster" Bombers from Canada

The first Canadian-built "Lancaster" heavy bomber has been flown to England by a Royal Canadian Air Force crew, and accomplished the ocean crossing in 9 hrs. 30 min. It was produced by Victory Aircraft Ltd., the Canadian Goverr ment firm which was previously the Aircraft D ision of the National Steel Car Corporation. Mc.e of these bombers are to be flown to this country for service with Bomber Command, R.A.F., and so far as possible they will be manned by R.C.A.F. squadrons when sent on operational flights against the enemy.

More Big Transports for U.S. Army Air Forces

Delivery of Lockheed C-69 "Constellations" to the U.S, Army Air Transport Command was planned to begin last month, and soon there should be news of these great machines being in service. The "Constellation" is described as "the most advanced air transport," and able to carry nearly 10 tons of freight. It has four 2,000 h.p. Wright "Cyclone" engines, and its top speed is reported to be about 350 m.p.h. The range is given as approximately 4,000 miles. The machine was originally designed for commercial service, with seating for 55 passengers and carrying a crew of nine.

The "Constellation" has succeeded the "Hudson" on the assembly lines of the Lockheed Corporation's Burbank factory.

North Atlantic Return Ferry Completes Two Years of Operation

British Overseas Airways have completed two years' operation of the North Atlantic Return Ferry. Nearly 600 crossings have been made, with an average of five or six machines in service at a time, and more than 80 per cent. of the crossings have been made in the last 12 months. On several occasions there have been between 35 and 40 flights in a month, and there has been only one fatal accident.

The Corporation took over the North Atlantic Return Ferry in September 1941 from R.A.F. Ferry Command, now part of the Transport Command, R.A.F., and began the operation of a two-way air service with six converted "Liberator" bombers. These machines had not been designed for such work, particularly under winter conditions, and many alterations had to be carried out, especially to the engines. Carburetter heating had to be installed to enable the engine to function satisfactorily in temperatures of below 40 deg. C., which it was known would be constantly encountered; alcohol sprays fitted for clearing ice from the curburetter, and shutters fitted to the oil coolers. Some kind of cabin heating had to be devised, with double windscreen panels to avoid icing in the cockpit, and this problem was solved satisfactorily only about six months ago.

The North Atlantic Return Ferry is flown over the most difficult ocean route in the world, and it was the only two-way air service that operated over this route last winter. The "Liberators" maintain the service with clockwork efficiency week in and week out. The westward flight, from this country to Montreal, takes about 17 hrs., and the eastward flight averages 13 hrs. Details of some of the faster flights which have been made, in both directions, were given in the "*Air News*" pages of the June 1943 "*M.M.*" The Captains who fly the aircraft have come from all parts of British Airways' far-flung routes, and are men who, before they tackled the North Atlantic, had for years been flying over the deserts and jungles of Africa, over India and the Far East.

Brazil Builds Fairchild Training Aircraft

Fairchild PT-19 training aircraft built in Brazil for the Brazilian Government, under licence from the Fairchild Engine and Aeroplane Corporation, U.S.A., have 175 h.p. Ranger engines made in the United States. Arrangements have been completed, however, for Ranger engines up to 200 h.p. to be manufactured in Brazil, and the Fairchild company are going to supply essential drawings and technical data, and also have undertaken to train Brazilian mechanics and engineers in their American factories.

* * * *

Two developments of the N. A. "Mustang" fighter reported recently are the P-51B, which has a 1,500 h.p. Rolls-Royce "Merlin" engine, with supercharger, and a 4-bladed airscrew; and the A-36 "Invader," a dive-bomber version in service with the R.A.F. and U.S. Army Air Forces.

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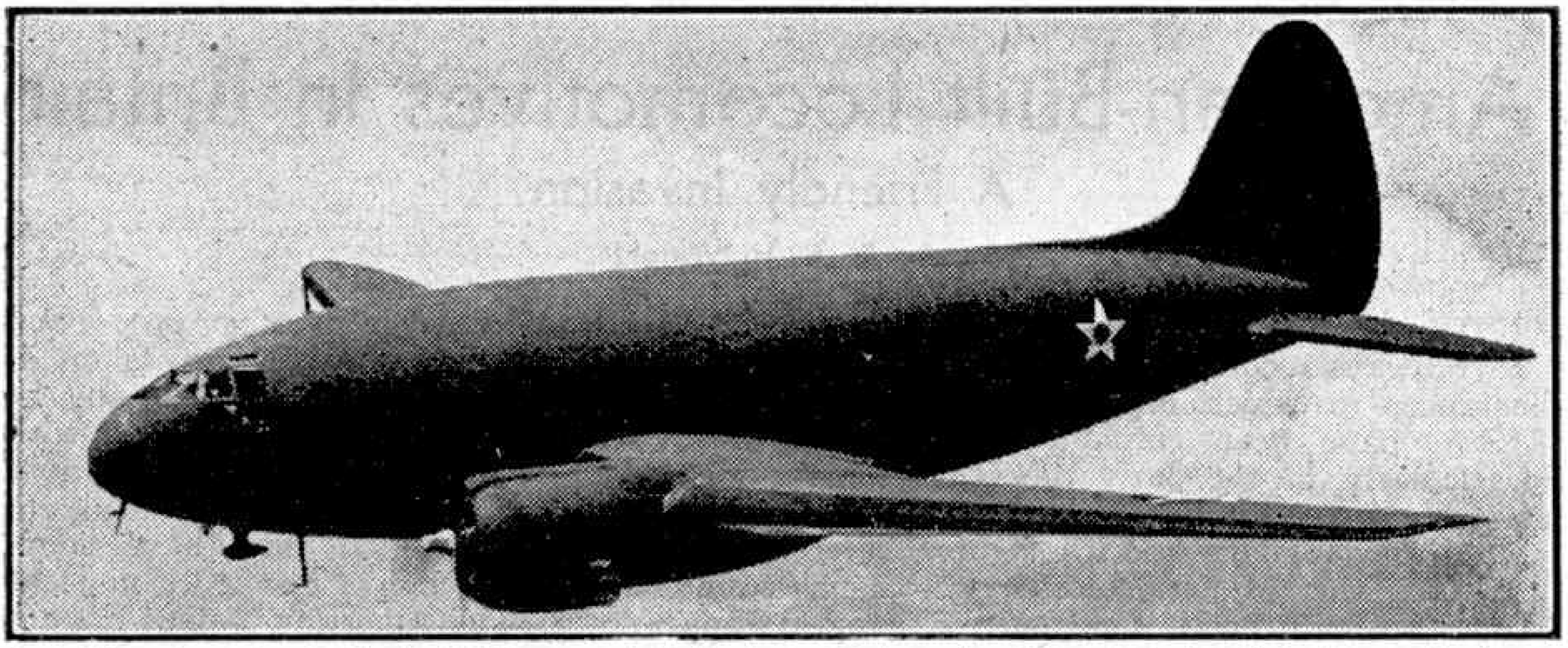
The Japanese have announced the names of three new types of aircraft they have put into service in the South Pacific war zone. The machines are the "Donryu" long-range bomber, the "Shoki" fighter and the "Shitei" reconnaissance machine.



A striking view of a Curtiss C-46 "Commando," the largest twin-engined transport aircraft in the world. It can carry parachute troops, jeeps, light artillery, or maintenance equipment such as spare aircraft engines, and has a very long range. Photograph by courtesy of the Curtiss-Wright Corporation, U.S.A.

U.S. Internal Air Service in Great Britain

A regular internal air service available to Allied personnel is being operated in Great Britain by an Air Transport Group of the Service Command, U.S. Army Eighth Air Force, over a circuit that includes 18 places of call. At 14 of these cargo is dealt with and four are main passenger stops. About 20 aircraft are engaged on this duty, and they fly a total of about 4,000 miles daily. In addition to this routine service, special and urgent flights are made as required.

* * * *

The U.S. Government are said to have begun planning a United States air police force, which will have a fleet of 25,000 military type aircraft. The proposed force is intended to form part of an international air police organisation.

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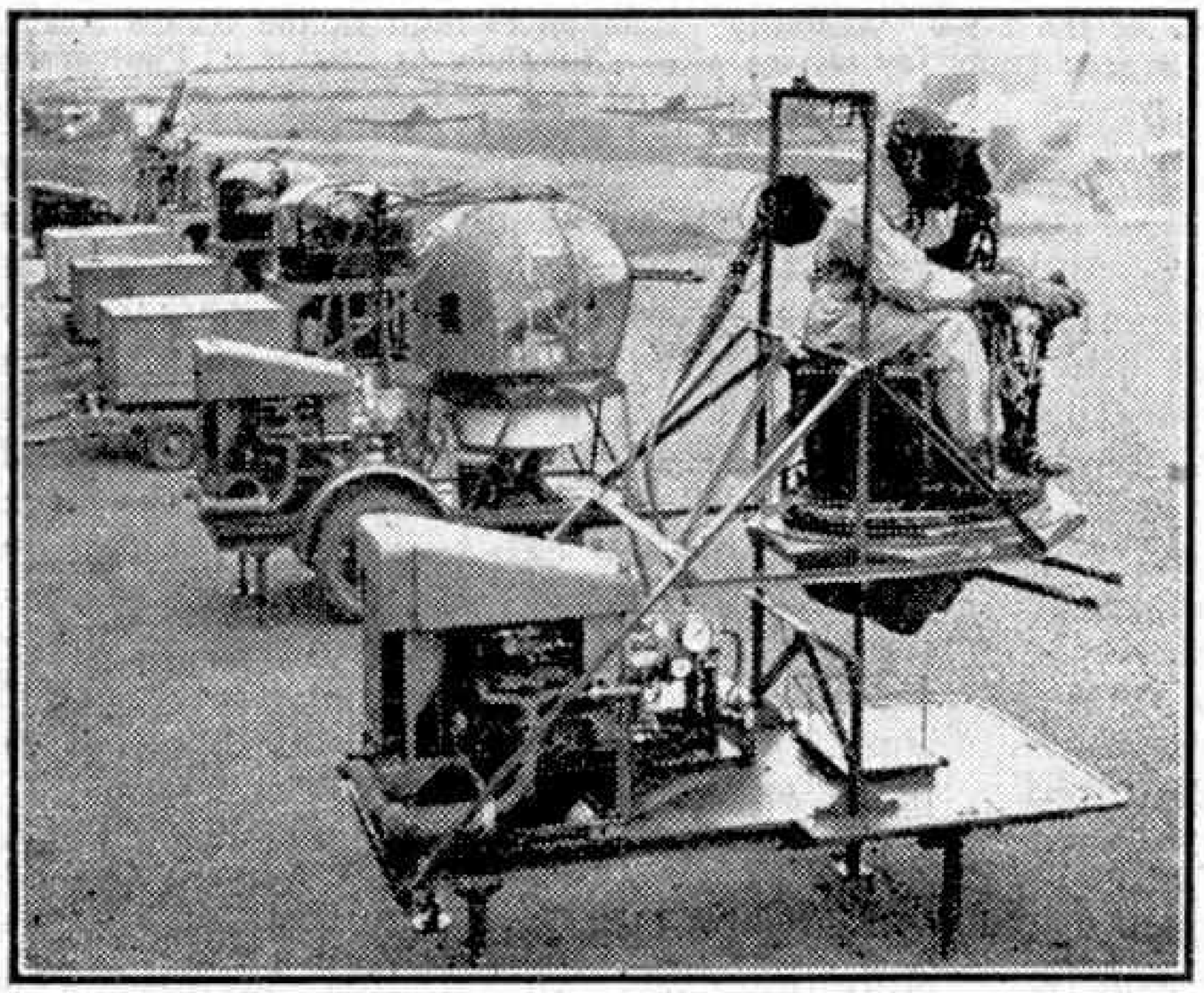
The latest Messerschmitt aircraft is the Me 410 twin-engined, multi-seat fighter, with which some of the Luftwaffe night fighter squadrons are equipped. It is very similar to the Messerschmitt Me 210 fighter.



Air Gunnery Training. Part of a line of turrets from which pupils sight on aircraft taking off and landing. The foremost turret is a periscopically sighted Frazer-Nash. Photograph "The Aeroplane" Copyright.

A Gift to Malta, G.C.

The tense first weeks of the air onslaught on Malta after Italy declared war were recalled by the recent presentation of the Gloster "Gladiator" fighter "*Faith*" to the people of the Island, by Air Vice-Marshal Sir Keith R. Park, Air Officer Commanding, Malta.

When the air war on Malta began, the only fighter aircraft there were four "Gladiator" biplanes for the Fleet Air Arm, still in their crates. The machines were quickly unpacked, and three of them were assembled and armed, the fourth being kept as a source of spare parts. The three completed machines, manned by volunteer pilots, patrolled the skies, and in the first 18 days of operation they intercepted 144 Italian bombers and fighters. The Maltese were quick to nickname the machines "*Faith*," "*Hope*," and "*Charity*," respectively, and "*Faith*" is the sole survivor of this gallant trio.

German Air Traffic Over Sweden Further Restricted

The new agreement between Germany and Sweden governing German air transit traffic across Sweden includes several new restrictions imposed as a result of the recent abuses of the previous agreement, the German-Swedish Convention signed in July 1940. It is now necessary for German aircraft flying across Sweden to be unarmed, to follow prescribed routes, and have special identification streamers attached to the wing tips. In addition the crews must have civil identity cards and wear civilian dress. The only intermediary stop now allowed is at the Stockholm-Bromma airport, on the most southerly of the stipulated routes.

Air Traffic in U.S.A. and South America

The vast network of air lines in the United States links up 260 places, and 18 air transport companies take part in the operations. In South America there are 44 air line companies, and between them they provide air services linking up 750 places. On the other hand the volume of air passenger traffic in the United States is six times greater than in South America, and the total mileage flown is about four times greater.

* * * *

The Avro "Lancaster" II heavy bomber has air-cooled Bristol "Hercules" engines instead of the liquid-cooled Rolls-Royce "Merlin" type fitted to the "Lancaster" I.

American-Built Locomotives in Britain

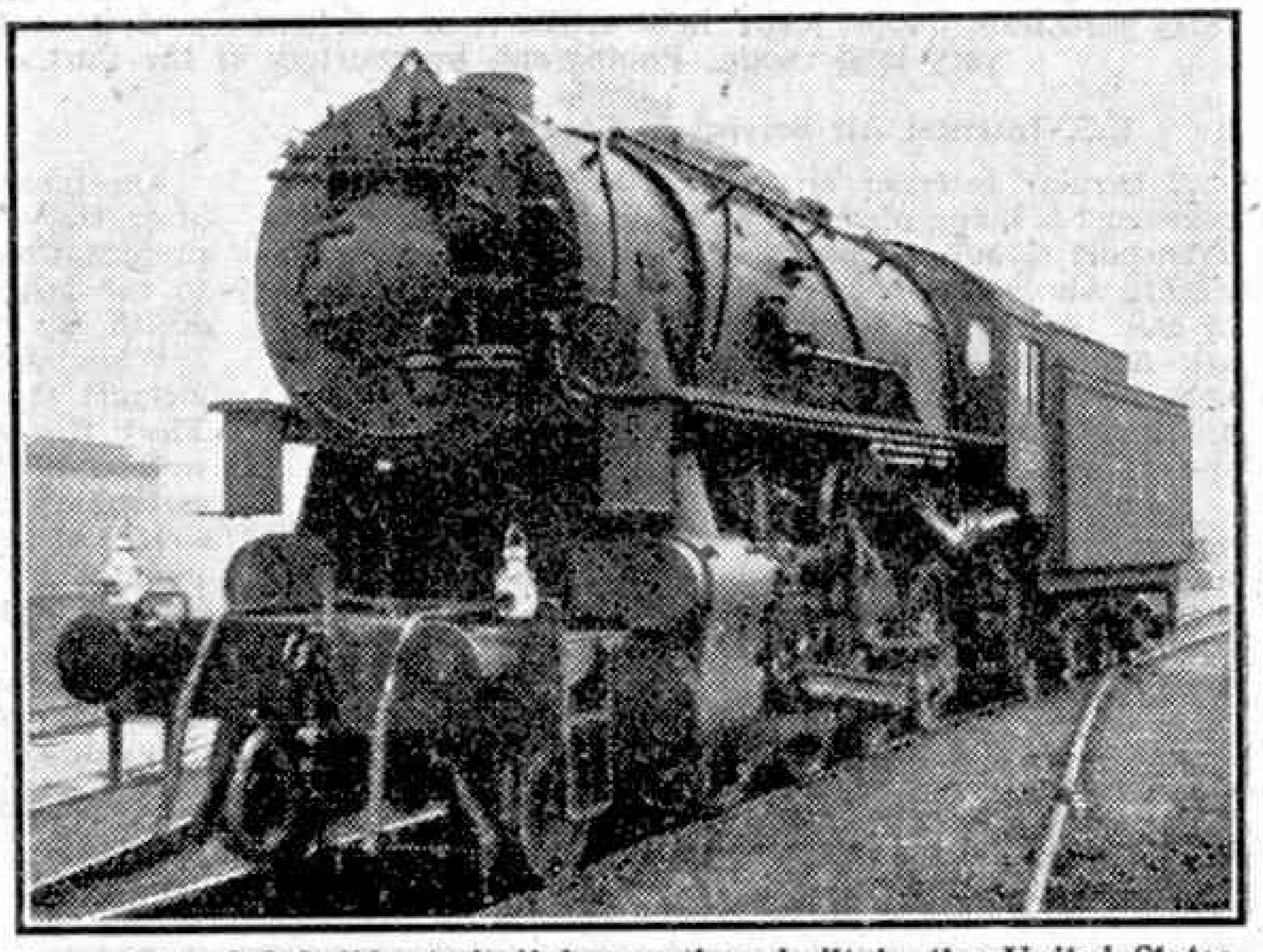
A Friendly Invasion

By R. A. H. Weight

THE locomotive history of British railways records a number of isolated instances in which engines built in the U.S.A. have been employed over here, particularly in the early days, on some specific stretch of line, such as that between Birmingham and Gloucester, later part of the Midland Railway. Some American-built engines of narrow gauge also have been used here, but the most outstanding past example of going to "Uncle Sam" for locomotive power was the purchase by the former Great Central, Great Northern and Midland companies in 1899 of batches of 2–6–0 goods engines. These were ordered on account of acute shortage of power in this country, due to rapid industrial growth in the Midlands, and because the companies' own shops, as well as those of British private builders, were then so fully occupied. In accordance with the standards of the period the locomotives concerned were fairly small, with a 4 ft. 7 in. diameter boiler and a weight of 82 tons in all. They fulfilled their purpose, but soon began to show signs of wear and so had a short life.

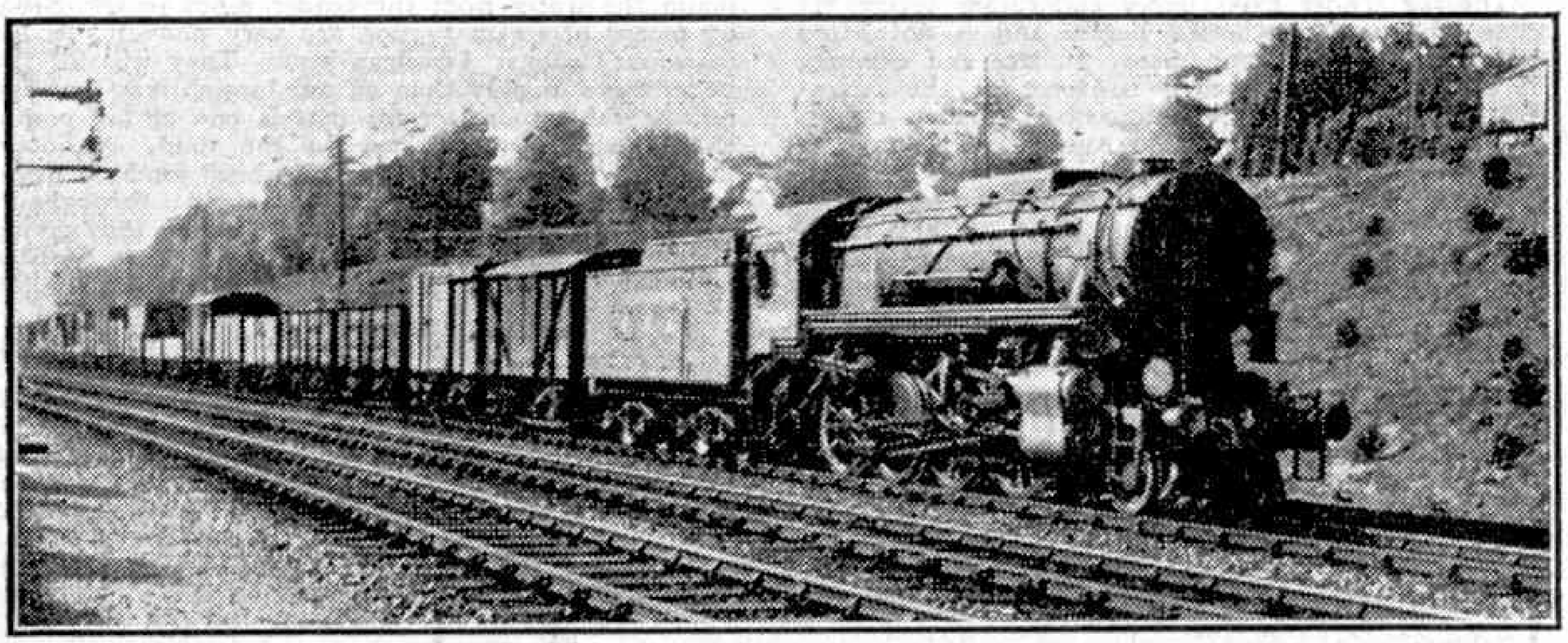
During the last Great War six- and eight-coupled American engines were used to a considerable extent, with many other varieties, by British Railway Operating Divisions on the military railways behind the various fighting fronts, but not in this country. Little did any of us think then that within 25 years we should again be plunged into a world-wide war that would necessitate enormous increases in rolling stock; or that, thanks to the generous lease-lend supply arrangements inaugurated by the U.S.A., literally hundreds of freight locomotives would arrive from America and be placed in service with British crews all over the British Isles, to work side by side with home-built engines.

Readers by this time will have seen at any rate a photograph of one of the 2–8–0s that form the greatest proportion of this friendly locomotive invasion, if they have not actually observed any at work. They should not be confused with the new British 2–8–0 Ministry of Supply "Austerity" class, which is now multiplying rapidly and to which they have some similarity. Both are of decidedly unusual appearance. The American 2–8–0s have a tall and massive, if rather ungainly look about them, although in order to conform to British and European clearance gauges they have had to be cut down considerably from what would be possible normally in the U.S.A. They are nicely finished in grey, with silver or white lettering, and carry small numbers ranging from 16xx to 24xx on the cab side. The inscription "U.S.A." appears on the sides of the tenders in larger letters, though in some cases the standard British Government sign "W.D." has been painted on or is being substituted.



One of the 2-8-0 "Austerity" locomotives built in the United States. It is seen ready for service after alterations at Cowlairs. Photograph by courtesy of the L.N.E.R.

The design was the work of Major J. W. Marsh, of the U.S.A. Corps of Engineers, and construction is being carried out simultaneously in several factories on behalf of famous private builders, including the American, Baldwin and Lima Locomotive Companies. On arrival here these

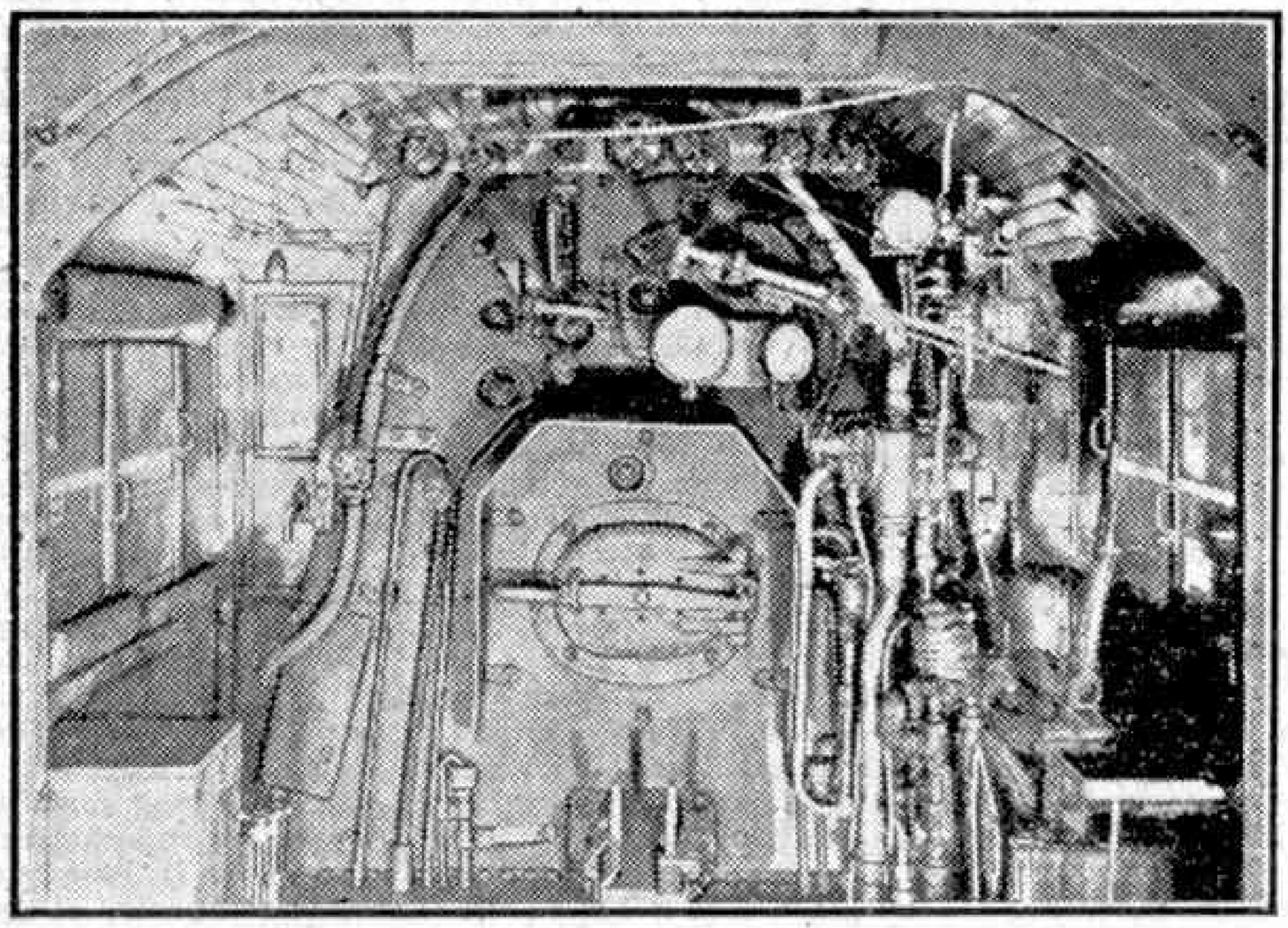


An American-built 2-8-0 in service. It is seen hauling a Southern Railway goods train, and our illustration gives a good view of the off side. Photograph by G. O. P. Pierce.

engines go for final fitting-up to one of the British locomotive works, though not necessarily to one belonging to the railway on which they will run. Liberal braking provision is a notable feature, with steam brake on engine and tender, Westinghouse for the train and pipes for vacuum brake should that system be required; and the preliminary work in shops includes fitting a train brake valve, ejector and reservoir, which will ensure that when the Westinghouse or vacuum brake is applied to the vehicles of the train, the steam brake will operate on the engine and tender with equal force. Frequently, of course, goods trains in this country are not provided with any automatic braking.

Slight adjustments are sometimes needed to the smoke-box and spark arrestor plates, and to the wheel tyre flanges, which may be a bit too thick. A handbrake has to be fitted on the fireman's side of the tender, reachable from the footplate, to comply with British regulations. Certain fittings are also added or altered slightly in accordance with a particular company's practice; the motion is coupled up and adjusted; and standard British lamp irons are fixed in the customary head-code positions. Then the engines are ready for testing and, if all is well, for the road.

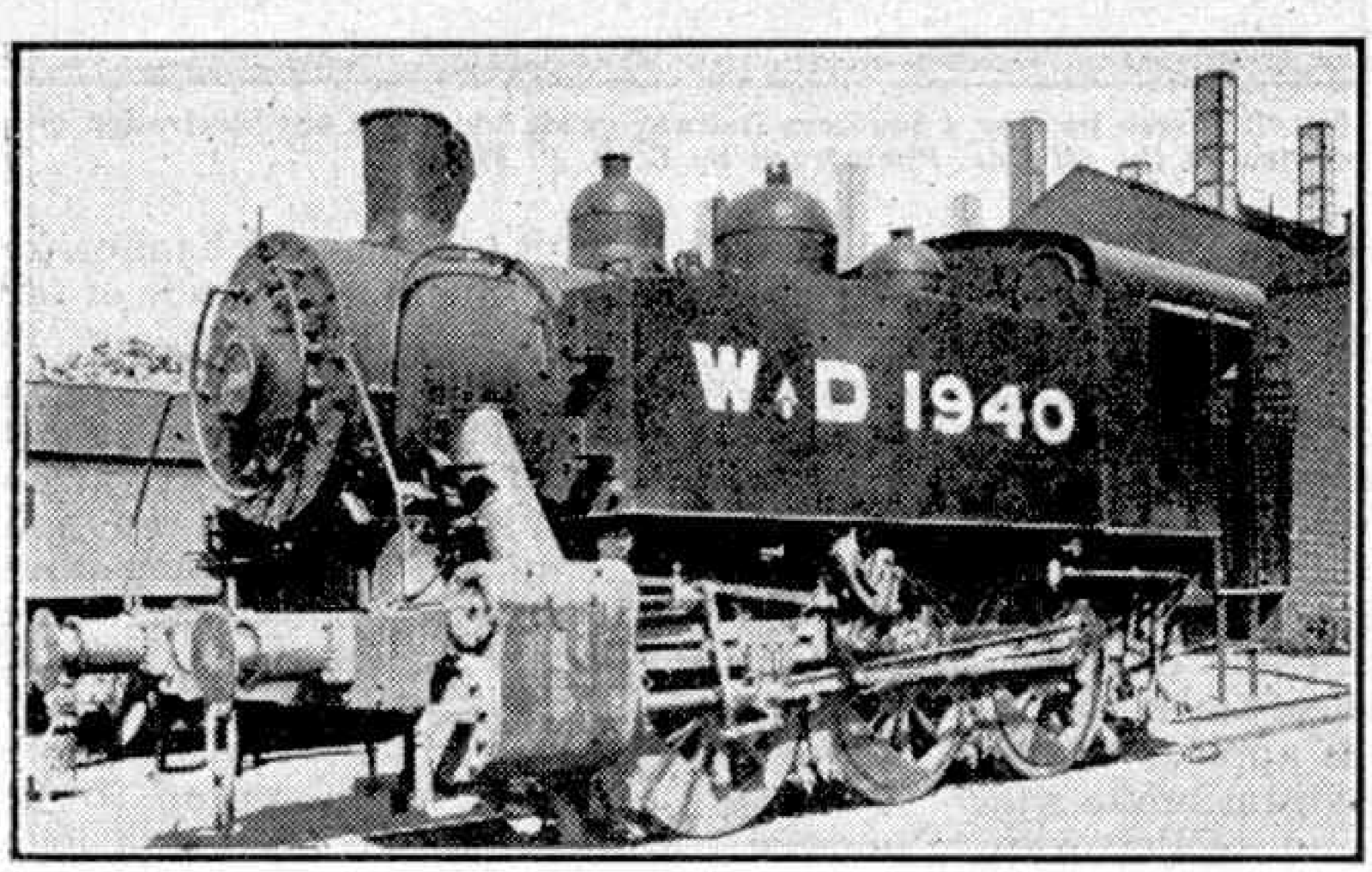
Now for a look round one of these Americans. Noting what appear to be unusual features first, we observe a long combined sand box and dome on top of the boiler, with safety valves immediately behind, and low chimney placed well back above the spacious smoke-box. The smoke-box has at the front a small door opening from the left, which is not centrally placed on account of the space taken up by the Westinghouse air compressor. The smoke-box is of smaller diameter than the boiler, which is high pitched, well above the wheels; also above the wheels is a high running plate forming part of the steel bar frames. There is a door on the fireman's (left) side of the cab front, giving access to this platform almost on the same level. Air reservoirs can be seen on each side immediately beneath the frames, and there are several outside pipes and fittings typical of American practice.



The cab of the American-built 2-8-0. Photograph by courtesy G.W.R.

The big tender looks bulky and rather severe. It runs on two four-wheeled bogies and is not fitted with water pick-up apparatus. In size and capacity it exceeds those attached to some of the largest British express passenger locomotives, though doubtless appearing quite small to American eyes.

The driving wheels have a diameter of 4 ft. 9 in. The two cylinders, in the outside position, are 19 in. in diameter with a 26 in. stroke, and as they are of modest size they should seldom be short of steam. The heating surface is 1,773 sq. ft. with a liberal superheater area of 480 sq. ft. As might be expected on a design emanating from the U.S.A. where locomotives are worked hard and coal is not always up to British quality, the firegrate is large for an engine of this type; it has an area of 41 sq. ft., equal to that on the Gresley "Pacifics." Provision has been made in some of the grates for oil fuel sprays, which might be required say in the Middle East. The boiler pressure is comparatively high at 225 lb. per sq. in.,



One of the 0-6-0 tank engines built in the United States for use in Great Britain. Photograph by courtesy of the G.W.R.

as on the new British "Austerity" locomotive and on the present standard L.M.S. and G.W. 2-8-0s.

The engine wheelbase measures 23 ft. 3 in., that of the tender 16 ft., and the total length of engine and tender over buffers is 61 ft. The adhesion weight on the four pairs of driving wheels is 63 tons. The weight of the engine in working order is 72½ tons, and with the tender filled with 6,500 gallons of water and 9 tons of coal the total weight is about 130½ tons. The tractive effort calculated on the usual basis of 85 per cent. boiler pressure is 31,490 lb., compared with the 34,215 lb. of the British counterpart, which has larger cylinders. Steam distribution is effected by Walschaerts gear through inside admission piston valves, the drive being carried to the third coupled axle. An unusual feature of the valve gear is that the dieblock works in the upper half of the link for forward gear, and in the lower half for backward, instead of up or down from the centre (mid-gear). The manifold, which on modern engines supplies steam at reduced pressure for all subsidiary purposes, is placed in this case just in front of the cab, outside, on the top of the boiler. Steam sanding gear is provided.

Fittings in the spacious cab seem somewhat strange at first. The driver's position is on the right-hand side. Rather unfortunately for him the steam brake handle is placed so high up as to be out of his reach when seated, and it takes a good deal of experience to secure just the right amount of gradual leverage to produce a steady brake application. Reversing and notching-up is effected by lever, which is rather unusual these days. Generally, however, the equipment is good and well arranged. The injectors that pump the water from the tender pipes to the boiler by means of steam suction are very powerful in the customary robust American style. They will fill the boiler more quickly than on our locomotives, but the process takes more steam; that is one of the points that need watching when on the road. Although they are long wheel-based engines built for hard work, compensated springing is provided throughout, utilising both coil and laminated springs, thus giving ample flexibility and as much resilience as possible for rough tracks near the battle zones. Speed is limited to about 40 m.p.h.

Reports so far indicate that on the whole these engines steam and ride well, and that they are not extravagant users of coal or water. Many firemen who have been accustomed hitherto to smaller and less powerful, or older, locomotives, have expressed their pleasure in the free running and economical performance of the Americans, which have lightened their task, always an arduous one on heavy freight workings. As they are high pressure engines, it will be advisable to try and keep them in as good trim as possible; if they get badly "run down" so that maintenance of steam pressure is difficult, their performance on hard military or goods work might deteriorate a good deal. Broadly speaking, these remarks apply also to the new British 2-8-0s. Some locomotive officials who have been watching performance of both types say that the Americans have a heavier blast and need to be worked harder when accelerating, say, a 60-wagon freight train from rest or uphill. On the L.N.E.R. the Americans appear to be load class 7, the British W.D. 2-8-0s, class 8. Both types are intended for service overseas on any standard gauge system if required.

There is no news so far of any of the new American engines having worked passenger trains in this country, but in company with a British W.D. sister 2-8-0 one has been seen hauling an empty British hospital train to a provincial depot after official exhibition in London. They are, however, seen in large numbers running all kinds of Government and industrial freight, food and mineral trains over many routes of the L.M.S., L.N.E. and G.W. railways, including some of those in Scotland where it is believed American engines had never been seen working before. While being "run-in" they work freight trains on the Southern system and they have appeared in that company's goods exchange yards in London.

No mention has yet been made of the other American locomotives at work here, which are less known and by no means as numerous, though more are arriving. They are of the 0-6-0 side tank shunting variety hailing from the Vulcan Iron Works, Messrs. H. K. Porter, and probably other United States engineering firms. They bear numbers 12xx, 14xx, 19xx, and examples of short-distance double-heading with British engines have already been noted. These not very pretty little locomotives are employed at certain military training camps, at large factories, on the G.W.R. and elsewhere. As will be seen from the illustration, they have outside cylinders and Walschaerts gear. The wheel diameter is 4 ft. 6 in., working pressure 210 lb. per sq. in., heating surface, including fire-box, 876 sq. ft. There is no superheater. The boiler contains 150 two-inch tubes 10 ft. long and the grate area is 19½ sq. ft. The water capacity of the side tanks is 1,200 U.S. gallons and the bunker can accommodate 1 ton of coal.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A RARE SIAMESE BIRD

The bird seen in the accompanying photograph is known to zoologists as *Gracupica nigricollis*, a bird of the starling family known by the common English name grackle. He belongs to H.R.H. Prince Chula Chakrabongse, who brought him from Penang Island in the southern part of Thailand, previously known as Siam. This bird is very rare, found only in Indo-China, and is likely to be the only one of his kind living in England. He is the second ever brought to this country from the Far East.

A rare grackle from the southern part of Thailand. Photograph by B. Chulindra, Rock, Cornwall.

The grackle is a kind of mocking bird, as he can make various noises such as laughing and screaming unbearably. He is very tame with familiar persons, but rather dangerous to strangers. As can be seen from this snapshot he plays about freely when he knows who is in his company. He lived in London during the heavy air raids and was nearly killed one night by a high explosive bomb, yet he was not nervous or scared of any kind of explosion.

At present the bird is doing his bit to help Britain to fight the way through to victory by collecting money for the Red Cross and St. John Ambulance Funds. A collecting box is attached to the window outside where his cage is, and on this is his short life story, with the words *"If you whistle to me, I will bow to you. I shall be grateful if you drop a penny in the box for the Red Cross and St. John Ambulance Funds. Thank you."*

B. CHULINDRA (Rock, Cornwall).

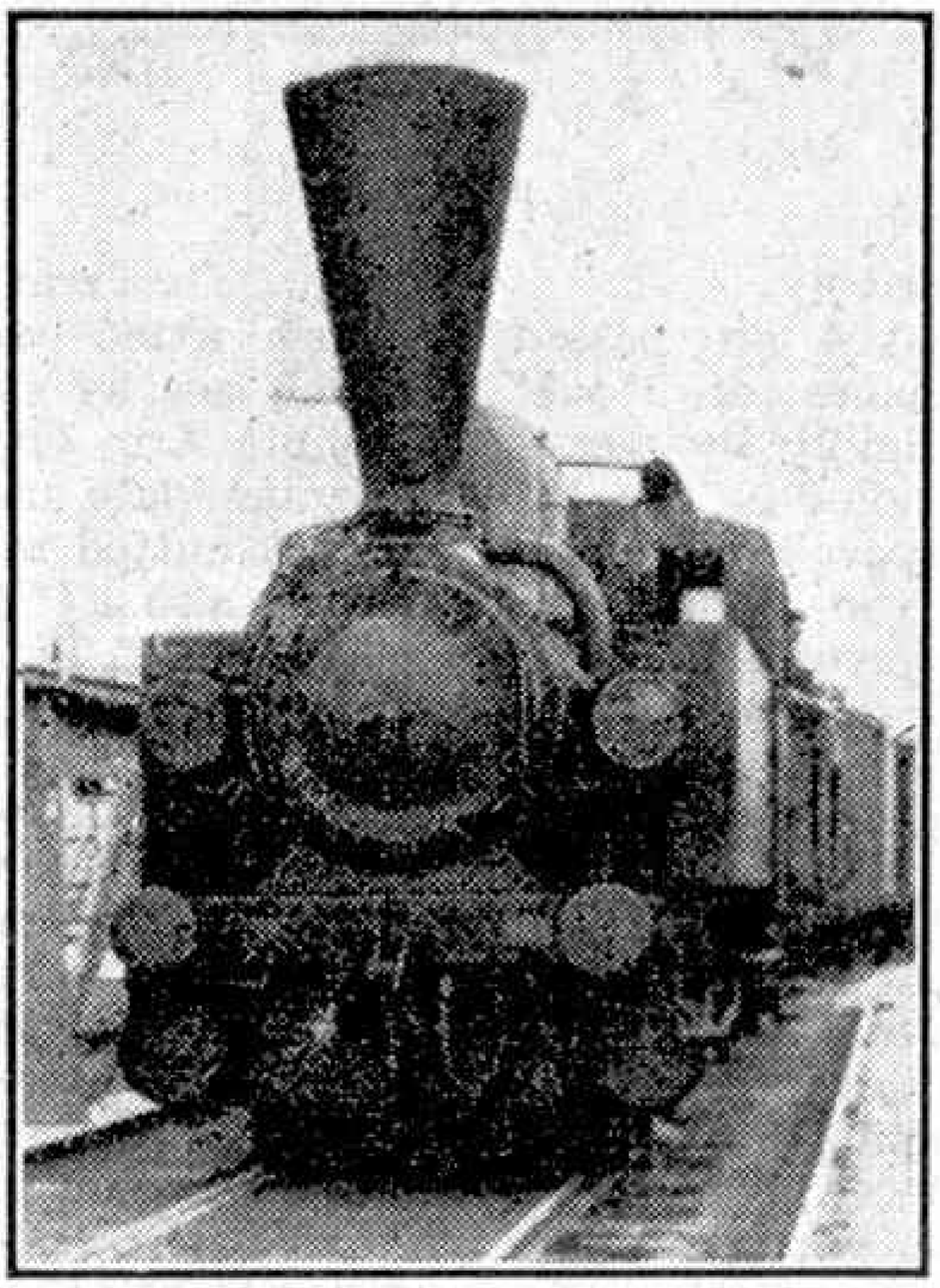
CONTRAST IN YUGOSLAVIAN TRAINS

While cycling in Yugoslavia before the war I made two short train journeys, and I shall never forget the startling contrast they provided.

The first of these runs was from Susak, the Yugoslavian half of Fiume, which has recently been prominent in the war news, to Delnice, about 30 miles inland. The train was a luxury express bound for such distant destinations as Vienna, Prague, Budapest and Warsaw, and the coaches were from almost every European country. The single track line climbed steeply through a tunnel in the Karst Mountains to a height of over 3,000 ft. There were two locomotives in front and one behind, and their combined smoke in the narrow tunnel made conditions almost unbearable. The smoke indeed poured into the coaches everywhere, even through the floor boards, until it was almost impossible to breathe.

The station at Delnice was a small shack, and it was necessary to jump on to the track and feel one's way in pitch darkness between lines of wagons.

The second journey, made next day, was from Kocevje, in Slovenia, to Ljubljana. This time the train was an echo from the days of the wild and woolly West. The four-wheeled coaches had open ends with iron railings, wooden seats and no lights. They rocked and rolled like ancient tramcars. The engine had a tall "coffee-pot" smoke stack, similar to the one illustrated. It was burning wood, and emitted clouds of pungent black smoke that dirtied everything.



A wood burner in Yugoslavia. Photograph by R. R. Bushell, Belfast.

Passengers sat on the steps with their legs dangling; the guard merely warned them not to fall off, otherwise *he* would be in trouble. They walked along the line at every stop, and in general turned the journey into a comic opera. The average speed seemed to be about 10 m.p.h., except on one hectic occasion when we raced perilously downhill at a good 15, bouncing on the track in alarming fashion.

To complete the fantastic picture, the train's company played football on the permanent way while we waited for a connection at a junction. When the expected train came in it nearly massacred half the footballers.

R. R. BUSHELL (Belfast).

Suggestions Section

By "Spanner"

(620) Differential Gear ("Spanner")

The differential gear shown in Fig. 620 is undoubtedly one of the most interesting examples of the mechanical value of the Meccano system. Differential gear is incorporated in the drive transmission in motor cars, the object being to allow for the difference in the speeds of the outer and inner road wheels when the vehicle is turning a corner.

In the Meccano example of this mechanism shown in Fig. 620 the back axle shaft consists of two separate Rods 1 and 2, the inner ends of which are journalled in opposite ends of a Coupling 3. In the centre transverse bore of this Coupling is secured a 2" Rod 4 that serves to carry the $\frac{7}{8}$" Bevel Gears 5. The grub-screws of the Bevels are removed so that they are free to turn about the 2" Rod. They engage with two similar Bevels 6 and 7 secured to the shafts 1 and 2 respectively.

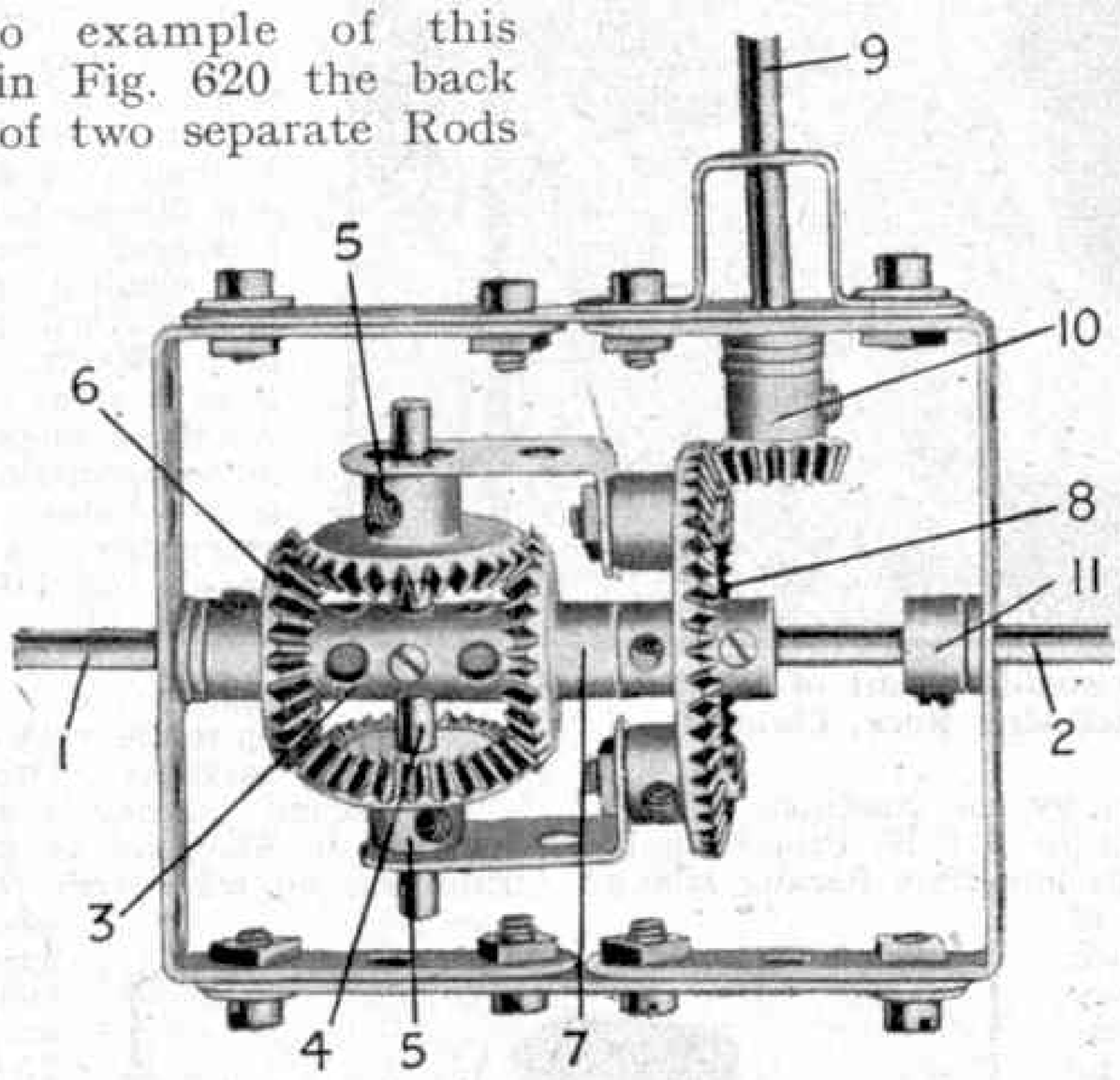


Fig. 620

The outer ends of Rod 4 are passed through the elongated holes of 1" × ½" Angle Brackets secured rigidly by means of ½" Bolts to opposite holes in the 1½" Bevel Gear 8, and are spaced therefrom by Collars placed upon the Bolts. The 1½" Bevel Gear is free to revolve independently about the axle shaft 2. The propeller shaft, which transmits the engine drive to the differential gear, is a Rod 9, and it is fixed in the ½" Bevel Gear 10, which engages with the 1½" Bevel Gear 8. Two Collars 11 are fixed to the shaft 2 to maintain the various gears in correct alignment and mesh and to prevent the gears 8 and 10 from slipping or binding. Two Washers also are placed against the boss of Bevel 6 for spacing purposes.

If one of the road wheels revolves at a greater speed than the other the Bevel Gears 5 begin to rotate and thereby adjust the difference in speed between the Bevel Gears 6 and 7. If the vehicle is running in a straight course the axles 1 and 2, and Bevel Gears 5, 6 and 7 must all rotate as one unit, since the road wheels are travelling at exactly the same speed.

(621) Reversing Mechanism for a No. 1 Clockwork Motor (R. Head, Blackburn)

Model-builders who do not possess a reversing Clockwork Motor will find the simple mechanism shown in Fig. 621 a very useful addition to working models such as cranes, in which a reversal of operations is required. Two Trunnions, spaced from the base Plate by Washers, form Bearings for a Rod 1, which carries a 1" Pulley and a 57-teeth Gear between the Trunnions. 1" × ½" Angle Brackets provide Bearings for a second 2" Rod. The rear Bracket carries also a Crank fitted with two Threaded Pins, which act as stops. This Rod carries a Double Arm Crank fitted with a 1" Triangular Plate and a 1½" Strip. A ¾" Bolt 3 is lock-nutted to the Triangular Plate and carries also a ½" Pinion, which meshes with a second ½" Pinion locked on another 2" Rod journalled in the remaining hole in the Triangular Plate. This Rod carries also a 1" Pulley 4. The Driving Band 3 serves to keep the Pinion in mesh with the 57-teeth Gear when the mechanism is in its normal position, and when it is required to reverse the drive the 1½" Strip is moved over until the Double Arm Crank comes into contact with one of the Threaded Pins.

The drive from the Clockwork Motor is taken to the 1" Pulley 4 through a Driving Band, which stretches or contracts when

the 1″ Pulley is moved to and fro. The drive to the model is taken from the 1″ Pulley on Rod 1.

An alternative method of constructing this reverse gear, if this is to be incorporated in a model crane, is to mount the

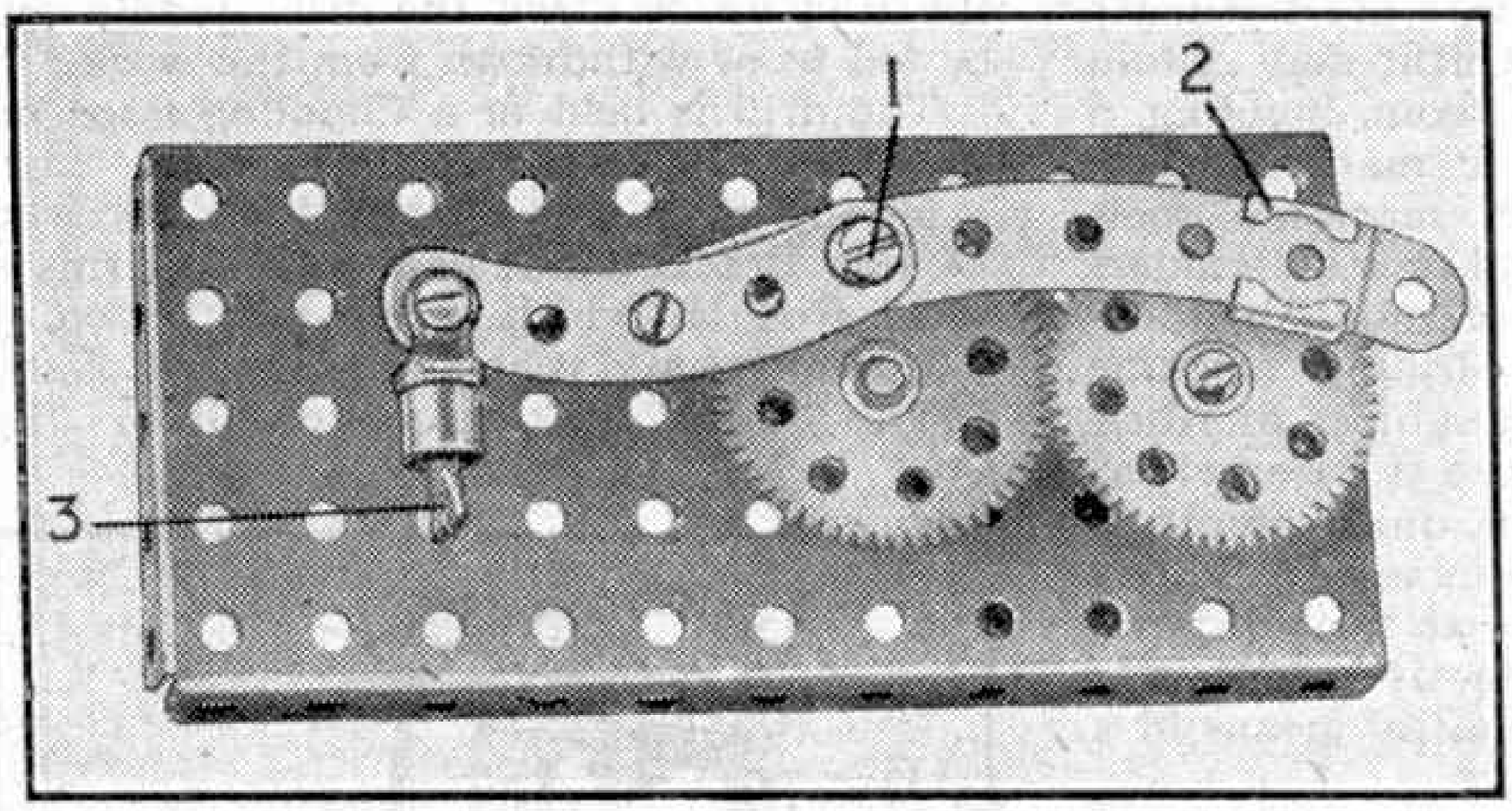


Fig. 622

57-teeth Gear on the end of the Rod forming the winch barrel. A Strip of convenient length can then be used for the reversing lever and the Pinions should be mounted as follows. The upper Pinion is carried on a ¾″ Bolt lock-nutted to the Strip forming the reversing lever, the lock-nuts holding also a Flat Bracket and a Reversed Angle Bracket at right-angles to the Strips. These provide bearings for a 1½″ Rod that carries a second ½″ Pinion and a 1″ Pulley. The reversing lever is pivoted in the fourth hole from the end carrying the Pinions, so that by moving the lever up or down either of the Pinions in turn can be brought into mesh with the 57-teeth Gear.

(622) Intermittent Motion Mechanism ("Spanner")

An unusual movement is obtained from the mechanism shown in Fig. 622, which can be used as an intermittent feed device. A somewhat similar movement is incorporated in a miniature film cinematograph for drawing the film intermittently through the "gate." Two 57-teeth gears are meshed together as shown, and one of them is driven from the power unit. A Pivot Bolt 1 is secured to one of the Gears by two Nuts; the moving arm is free to pivot on this Bolt and is spaced from the Gear by a Collar. The arm consists of a 4″ Curved Strip extended by means of a 2½″ large radius Curved Strip. The end of the 4″ Strip slides in the Eye Piece 2 that is pivotally attached to the second 57-teeth Gear. The position of the Eye Piece in relation to the Bolt 1 is very important. It should be arranged almost diametrically opposite to the Bolt, but the operation of the device will be improved if the Eye Piece is slightly in advance of the direct opposite position when its Gear is turning in a clockwise direction.

The outer end of the 2½″ Curved Strip carries an End Bearing in which a Centre Fork 3 is fitted. In the actual device this part, known as a "claw," is shaped to fit the slots in the film, and in the model the centre Fork may engage a Sprocket Chain or belt for providing the necessary feed motion. When the Gears rotate movement is imparted to the Centre Fork 3, which follows a straight path for a short distance and then moves upward and backward in a semicircle.

To serve its intended purpose the mechanism should be arranged exactly as shown, but by varying the position of the Bolt 1 in relation to the Eye Piece 2, some very interesting movements are imparted to the Centre Fork 3. Any suitable part may be fitted in place of the Centre Fork, according to the purpose in view.

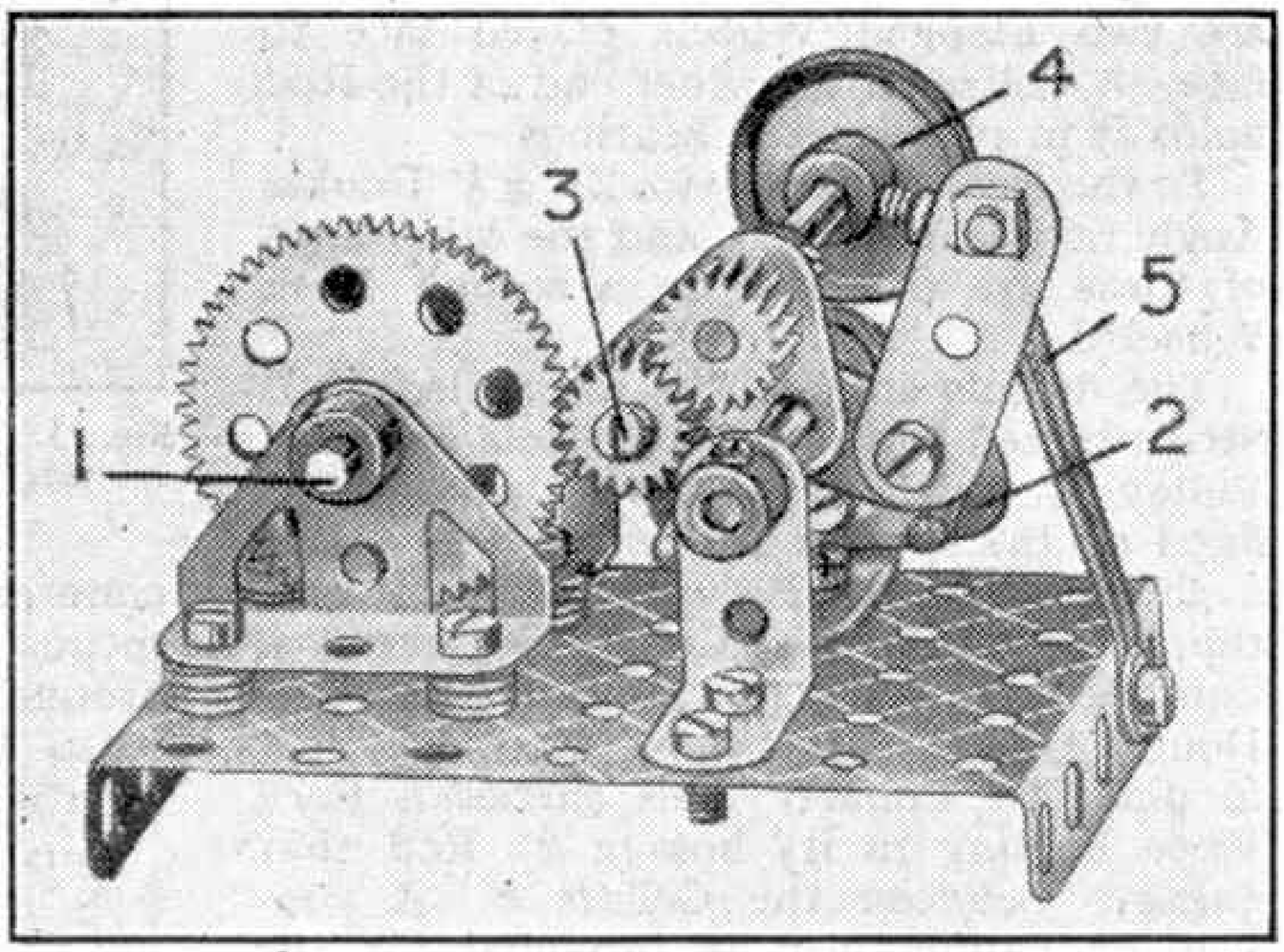


Fig. 621

New Meccano Models

Vertical Drilling Machine—Steam Engine and Boiler

MODEL-BUILDERS who are fortunate in possessing a big Outfit may obtain great fun and pleasure from building a model reproduction of a machine shop incorporating miniature machine tools such as lathes, drills and saws. Readers interested in this type of model-building therefore will find the drilling machine shown in Fig. 1 a useful subject for their attentions. This model also is an excellent subject in itself, and it is quite simple in construction, so that less fortunate readers having only small Outfits at their disposal will find it equally attractive, especially as it may be set in motion by means of a *Magic* Motor.

The model is built up on a base consisting of a 3″ Pulley Wheel, in the boss of which is fixed a 5″ Rod that carries at its upper end a Bush Wheel. Also mounted on this Rod is a Crank 2 and a Coupling 3. To the arm of the Crank is bolted a 1¼″ Disc that forms the work-table, and to the Coupling is bolted a 2½″ × 1½″ Double Angle Strip that forms the bearings for the countershaft 4. The work-table can be moved up or down the Rod as required and can be locked in any desired position by means of the lock-screw 5, which is a ¾″ Bolt carrying a Collar. The Collar is locked to the Bolt by means of a Threaded Pin in one of its tapped holes. The countershaft 4 carries between the arms of the Double Angle Strip a 2″ diam. Pulley Wheel and on its right-hand end are two Flanged Wheels placed face to face. A Collar on the other end of the Rod holds it in place in the bearings.

To the Bush Wheel 1 two 2½″ × ½″ Double Angle Strips are bolted, and the other ends of these are attached to a second Bush Wheel 6.

The drilling spindle 7 is journalled in 2″ Strips bolted to the Bush Wheels and a 1″ Pulley is fixed to its upper end. Also fixed on the spindle are two Collars 8 and a third Collar 9. Between Collar 9 and the lower of the two Collars 8 there is a Compression Spring. Mounted in the Double Angle Strips is a Rod 10, held in place by Collars. This carries a Fork Piece holding in its boss a 2″ Rod that engages between the Collars 8. A convenient handle grip is provided for the Rod by a Handrail Coupling. By moving the Rod up or down the drill spindle can be fed to or withdrawn from the work.

The drill is held in a Coupling fixed on the lower end of the drilling spindle.

Mounted on the Bush Wheel 6 is a Double Bracket that carries in its arms a short Rod 11, which is fitted with two ½″ loose Pulleys and is held in place by Collars.

The drive is transmitted from the countershaft 4 to the drilling spindle by means of a Driving Band, which passes around the 2″ Pulley, then over the ½″ loose Pulleys and around the 1″ Pulley on the spindle.

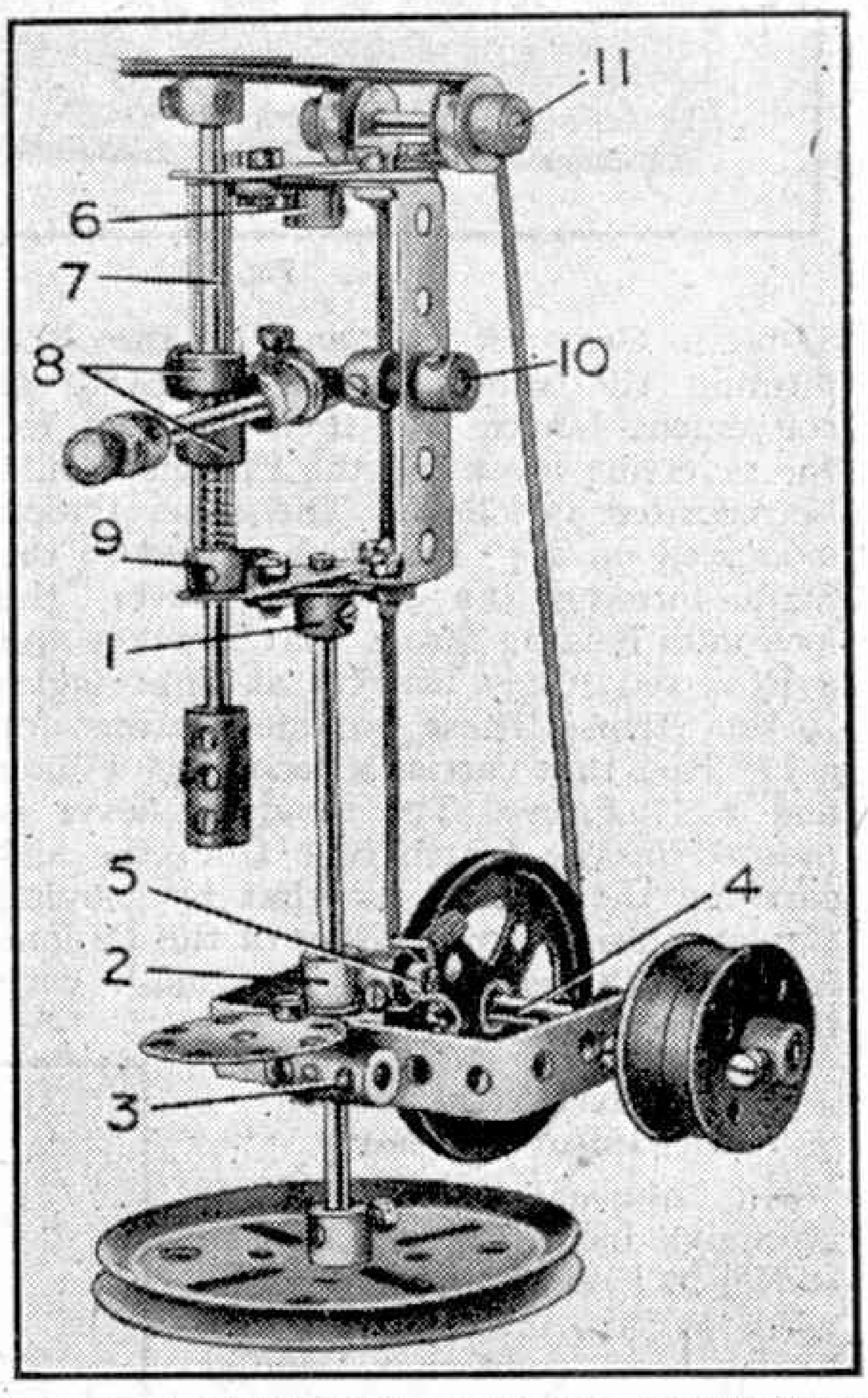


Fig. 1. Miniature tools make fine model-building subjects, and here is an interesting Meccano vertical drill with attractive movements.

Parts required to build model Drilling Machine: 2 of No. 6; 1 of No. 11; 2 of No. 15; 1 of No. 15b; 1 of No. 17; 1 of No. 18a; 1 of No. 19b; 2 of No. 20; 1 of No. 20a; 1 of No. 22; 2 of No. 23; 2 of No. 24; 11 of No. 37a; 11 of No. 37b; 1 of No. 47; 2 of No.

48a; 12 of No. 59; 1 of No. 62; 2 of No. 63; 1 of No. 111; 1 of No. 115; 1 of No. 116a; 1 of No. 120b; 1 of No. 186b; 1 of No. 217a.

The fine steam engine and boiler shown in Fig. 2 is operated by a *Magic* Motor, and when this is set in motion the engine works realistically. A $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate forms the base of the model, and this is strengthened by means of two $5\frac{1}{2}''$ Angle Girders bolted along its sides. A Boiler complete with one End is secured to the Plate by Angle Brackets, and a Chimney Adaptor fixed to the Boiler End by a Bolt supports the Chimney. Mounted on the Boiler End also is a 1" Screwed Rod fitted with a $\frac{1}{2}''$ loose Pulley 1. This represents the pressure gauge. A $5\frac{1}{2}''$ Rod 2 passed through holes in the Boiler as shown is held in place by Collars. At one end the Rod carries a Flywheel and a 1" fast Pulley 3, and at the other end is a Bush Wheel. A $\frac{3}{4}''$ Bolt 4 locked in the Bush Wheel forms the connecting pin for the piston rod 5. This Rod slides in and out of the cylinder, which is of the pivoted oscillating type and is formed by a Sleeve Piece. The Sleeve Piece is pivoted by lock-nutting it on a Bolt 6 fixed in a Double Bent Strip bolted to the side of the Boiler. The cylinder covers are Flanged Pulleys pushed over the Sleeve Piece.

A *Magic* Motor is bolted to the Flat Plate and its driving Pulley is connected by means of a Driving Band to the Pulley 3.

Parts required to build model Steam Engine and Boiler: 2 of No. 9; 1 of No. 12; 1 of No. 12b; 1 of No. 15a; 1 of No. 17; 1 of No. 18b; 2 of No. 20b; 1 of No. 23a; 1 of No. 24; 18 of No. 37a; 16 of No. 37b; 1 of No. 45; 1 of No. 52a; 3 of No. 59; 1 of No. 132; 2 of No. 136; 1 of No. 162; 1 of No. 162a; 2 of No. 163; 1 of No. 164; 1 *Magic* Motor.

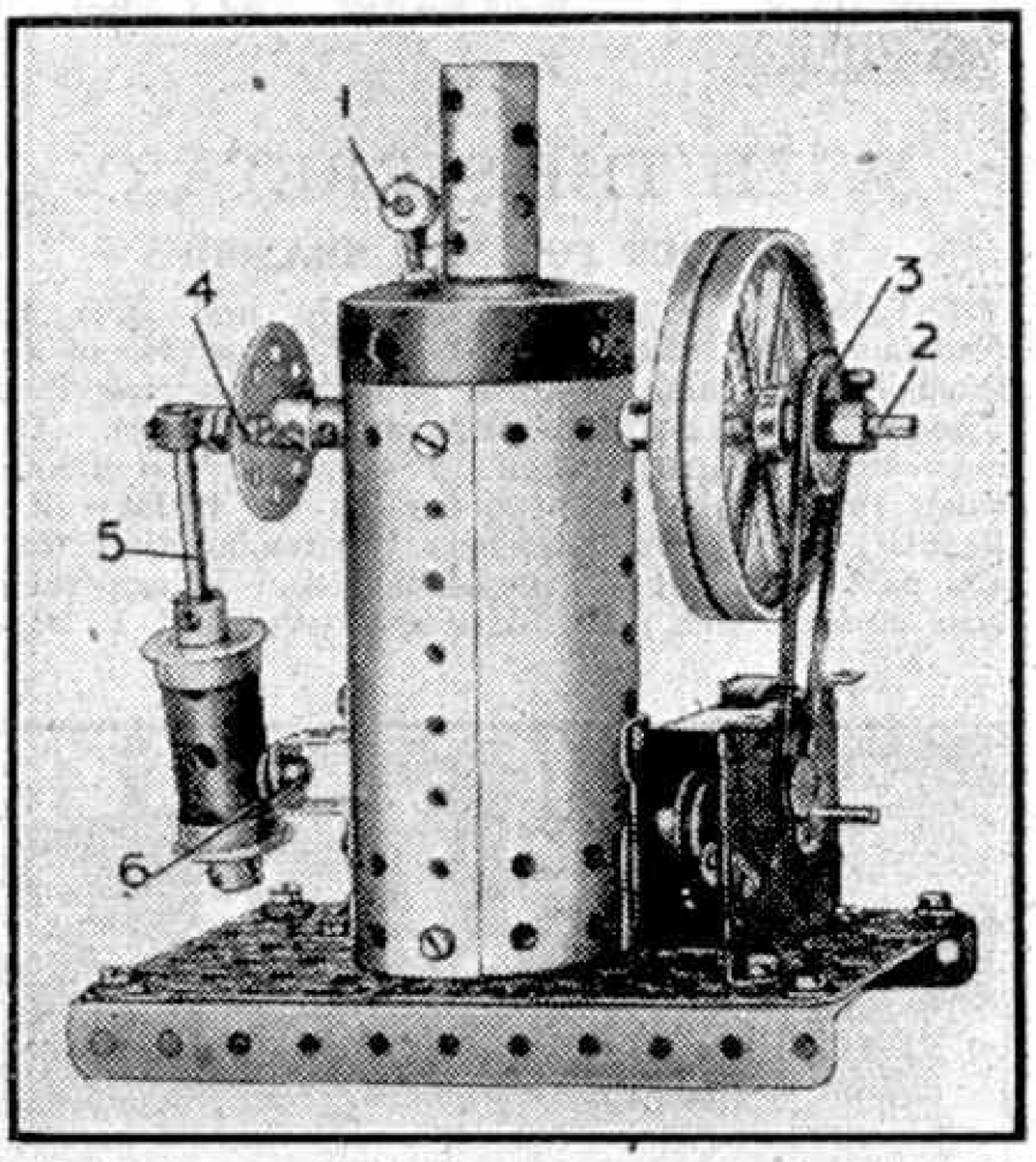


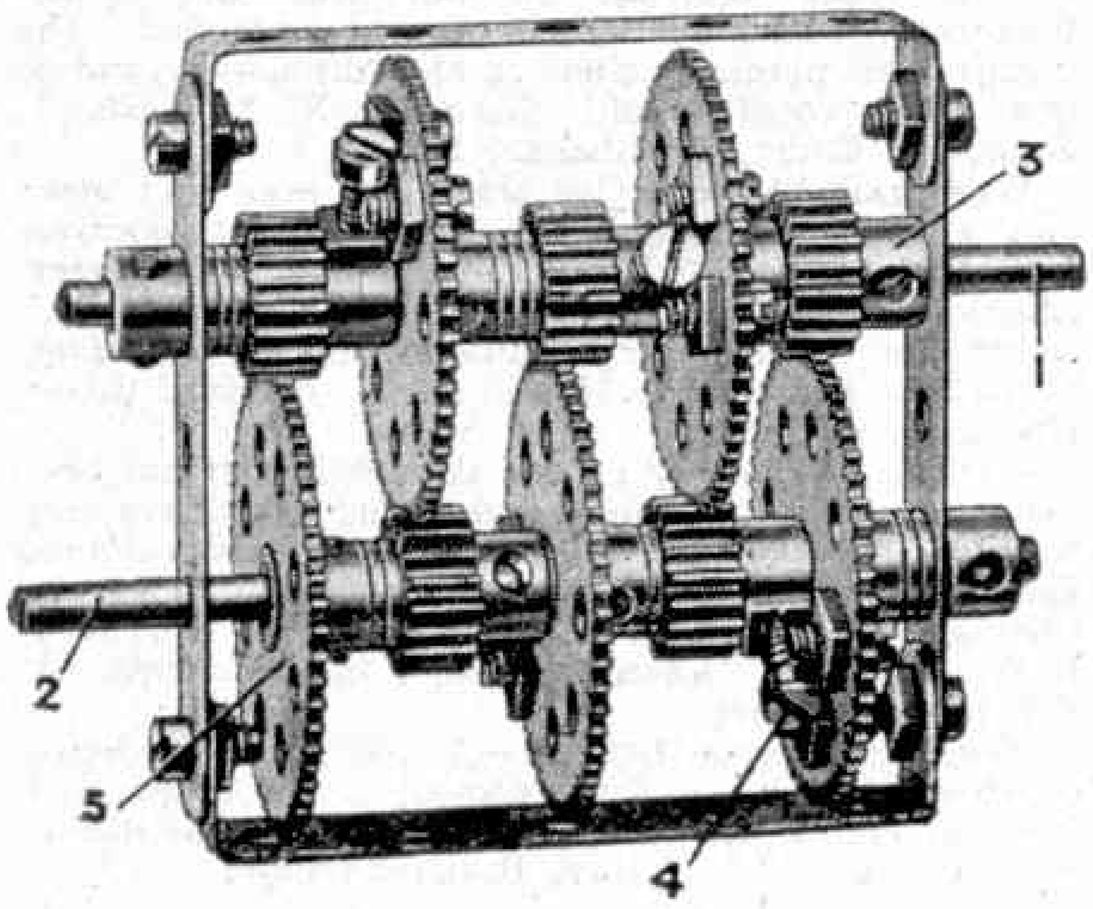
Fig. 2. Comparatively few parts are required to build this excellent Meccano steam engine and boiler.

Model-Building Contests For All

By "Spanner"

There is still ample time to enter one of the two fine contests announced in the October "*M.M.*," and to win one of the many handsome cash prizes offered to successful entrants in them. Both competitions remain open until 30th November for home readers, and until 31st May 1944 for those living overseas.

The contests were specially designed to suit readers of all ages. In the first, open to all, without any restrictions in regard to age or size of Outfit, competitors are asked to submit a gear change mechanism of some kind. Good examples are the compact high ratio reduction gear shown in the illustration at the foot of this page, and the gear-box from the Meccano Motor Car Chassis. There are of course many other types of gear-box, some simple and others more complicated, and any mechanism of this kind is a suitable subject for this competition. All that competitors have to do is to send in sharp photographs or good drawings of their entries, addressing these to "*Gear-Box Competition, Meccano Limited, Binns Road, Liverpool 13.*"



The second contest was planned to bring in younger readers, for entrants in it must be under 10 years of age. Any kind of small model whatever can be submitted, but no more than 20 Nuts and 20 Bolts can be included in it, and no Gear Wheels, Worms, Pinions or special Meccano Parts, such as Ball Races, Digger Buckets or Ships Funnels, must be used. Strips, Plates, Girders and Angle Brackets, with Rods and Pulley Wheels, if desired, will give competitors every opportunity of building up fine entries. A neat drawing of the model is all that the competitor need send in, and this must be addressed "*Junior Model-Building Contest, Meccano Limited, Binns Road, Liverpool 13.*"

In each competition the prizes in both Home and Overseas Sections will be £2/2/-, £1/1/- and 10/6 respectively, and there will be consolation awards of 5/- each for other good models.

Club and Branch News

WITH THE SECRETARY

LOOK OUT FOR NEW BRANCHES

The revival of interest in Clubs and Branches continues, and this month I give a fine list of enthusiasts who wish to form Branches, ranging from Glasgow in the north to Torquay in the south. The next step is incorporation. I am always delighted when this notable event occurs in the history of a Branch, for it gives members the feeling that they are part of a great organisation and brings them into closer touch with Headquarters, and I hope that the Branches now being formed will soon be qualified. There is no doubt that they will be, very quickly, if all enthusiasts and "*M.M.*" readers living near their headquarters act as they should, that is if they get in touch with the founders immediately and give them their cordial support, not only by joining in meetings but also by looking out for more new members.

Members of the Three Bridges Branch, No. 453: Chairman, Mr. G. C. W. Baldwin; Secretary, O. J. Baldwin, who is on the extreme left in our photograph. This Branch was incorporated with the H.R.C. in September. The Branch has operated an outdoor line known as the "Ryburn Valley Railway," on which there were nine stations. The track was 320 ft. in length, and 11 locomotives were in constant use on it.

MERIT MEDALLIONS

Secretaries in need of report forms and other items should notify me immediately. Report forms are especially needed, since the "*M.M.*" offers the best means of publicity for Clubs and Branches among those who are likely to be worth-while recruits. Space is limited, so I try to give turns to all organisations, but I cannot do anything for those from which I receive no reports at all.

And now a word to Leaders of Clubs. They should not overlook the award of Merit Medallions for the present session, and for the previous one, if no nominations were made for it. The Merit Medallion is the highest award associated with the Guild, and in each Club two of these distinctions are available in every session. Nominations are made by the Leader, who knows what each member is doing, and those for the present session should reach me before the end of December

PROPOSED BRANCHES

NEILSTON—Mr. J. McDonald, Jnr., South Manse, Neilston, Glasgow.

LIVERPOOL—P. Bailey, 45, Kylemore Avenue, Mossley Hill, Liverpool 18.

OLDBURY—Mr. J. E. Yeadon, 48, Broadmoor Avenue, Langley, Oldbury.

TORRE—Mr. P. Giles, 74, Torre Hill Road, Torre, Torquay.

SHEFFIELD—F. Skelton, 13, Bickerton Road, Hillsbrough, Sheffield 6.

DUKINFIELD—Mr. L. O. Broadbent, 395, Cheetham Hill Road, Dukinfield, Cheshire.

PRENTON—Mr. K. Hyland, 13A, Gorsefield Road, Prenton, Birkenhead.

PUDSEY—Mr. V. Coffey, 15, Waterloo Grove, Pudsey.

CLUB NOTES

TOTNES M.C.—Aircraft recognition and Morse signalling have been taken up. Picnics and Rambles on the moors, with Cricket, were enjoyed as long as possible. Points are being awarded for all good work, and the "House" that wins most points during the session is to be given a special treat. Club roll: 12. *Secretary:* P. Pascall, The Gables, Totnes.

PLYMOUTH M.C.—An Electrical Section has been formed. The Printing Section is busy with Club notices and stationery, and the Dramatic Circle is to produce a play. A Parents' Afternoon proved a great success. The Club Gauge "0" track has been extended, and new ballast and scenery provided for the Hornby Dublo track. Club roll: 94. *Secretary:* S. R. Finnemore, 5, Mutley Plain, Plymouth.

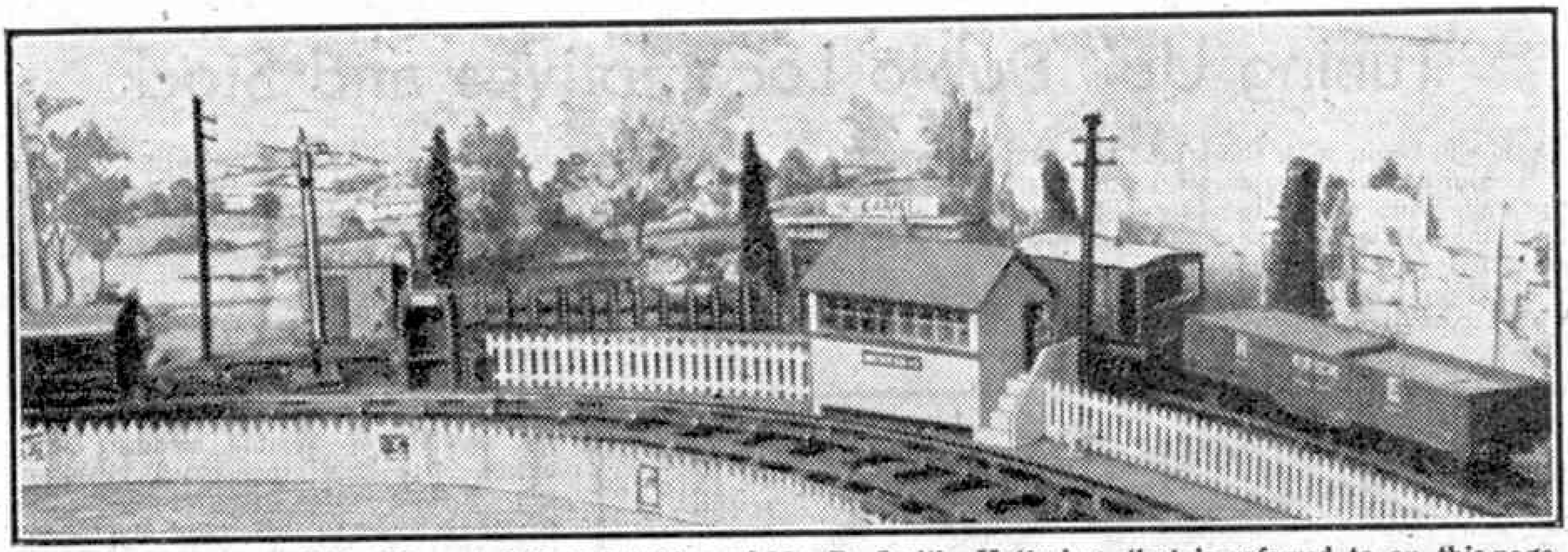
BRANCH NEWS

CANFORD MAGNA—An excellent start has been made, with the election of General Manager, Chief Engineer and other officials, and a general overhaul of the track material as this was laid down. Locomotives also have been cleaned and oiled. The layout was planned after careful discussion and is now under construction. *Secretary:* R. M. Jelfs, 1, Broadway Court, Broadstone, Dorset.

WARNHAM—An effective track has been laid down and a good service is being run. Six locomotives form the stud. The Library is growing. The latest addition is a collection of pre-war issues of the "*M.M.*," which are proving very valuable indeed. *Secretary:* S. Delves Broughton, Home Farm, Pondtail Road, Horsham, Sussex.

WINFRITH—Scenery on the Branch layout has been made more realistic, signals and rolling stock have been repainted, a loop line has been added and coloured light signals have been brought into use after careful testing. Splendid running has resulted. *Secretary:* I. W. Plummer, "Allon," School Lane, Winfrith, Nr. Dorchester, Dorset.

BARNARD CASTLE SCHOOL—A fine layout is being constructed, with a long tunnel, a dockyard and Meccano cranes and other dockside features. *Secretary:* N. I. Dugdale, The School, Barnard Castle.



An effective corner of the M. and G.N. Joint Line of Mr. D. Smith, Kettering, that is referred to on this page.

Joint Working Schemes in Gauge 0

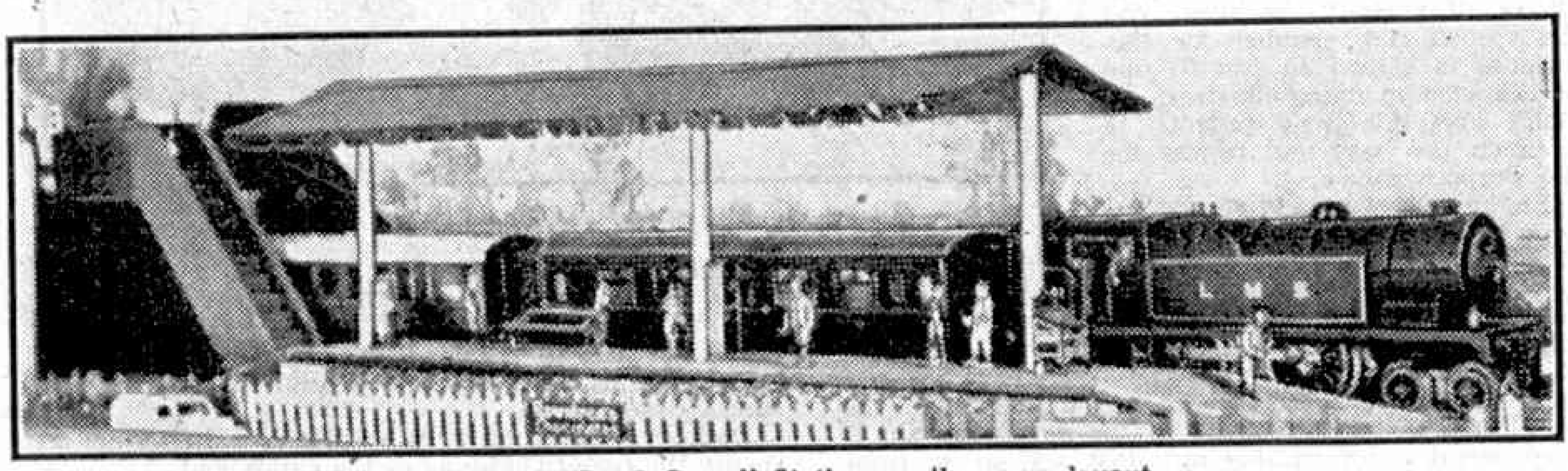
IN miniature, as in real practice, the use together of the rolling stock and the locomotives of more than one company is always interesting. It often occurs on H.R.C. Branch layouts or when several boys operate together.

An interesting layout the operations of which are based on the actual practice of a real joint line is given in the illustrations on this page. This has been developed by Mr. D. Smith of Kettering to represent broadly the Midland and Great Northern Joint Line, a system in which the present L.M.S. and L.N.E.R. have retained the interests formerly held by their constituent companies from which the line gets its name. For many years the original system maintained its own Locomotive Department, but some time ago, under a reorganisation scheme, locomotive management and working became the responsibility of the L.N.E.R. On the miniature line, however, Hornby Locomotives of both L.M.S. and L.N.E.R. types share the working, and the coaching stock also includes vehicles of both companies. This arrangement is quite reasonable, however, for M. and G.N. trains frequently included vehicles of L.M.S. and L.N.E.R. origin, and the locomotives were of both old Derby and Doncaster types, helped out at times on long through runs by more modern L.M.S. engines.

The plan of the line is broadly a continuous oval, and there is a station situated on each of the longer sides of the track. One of them has an island platform placed between the main track and a long station siding. This represents South Lynn. The other station, which is larger, also has a track terminated by buffer stops in addition to the through main line. This dead-end track is connected to the main track at the station by means of points, but it is also prolonged to run parallel with the main track and forms a loop which finally joins up with the main line near "*South Lynn.*" In addition an avoiding line extends outside the main track right along one side of the layout, and by-passes the larger station by running into a tunnel for the whole length of the station. This larger station has to represent both Leicester and King's Lynn. Leicester of course is not on the real M. and G.N. system, but it makes a convenient terminal point for through running operations.

Although there is in effect double track available for quite a distance, owing to the avoiding line and the through line of the larger station running parallel, single track working is the rule. In this the practice of the real route is followed, for the M. and G.N. includes considerable stretches of single track. Both passenger and freight services are operated, the former being dealt with principally by a Hornby L.M.S. 4–4–2 Tank. Passenger trains are made up of both No. 2 bogie Corridor and ordinary No. 1 four-wheeled Coaches, and the "joint" character of the system is well represented in the formation. For freight traffic there is an L.N.E.R. No. 0 Locomotive. Vans for perishable goods are prominent, and there are the usual open Wagons and Vans for coal and general goods. There is also one of the very effective Hornby High Capacity Wagons, this being an L.N.E.R. vehicle for brick traffic.

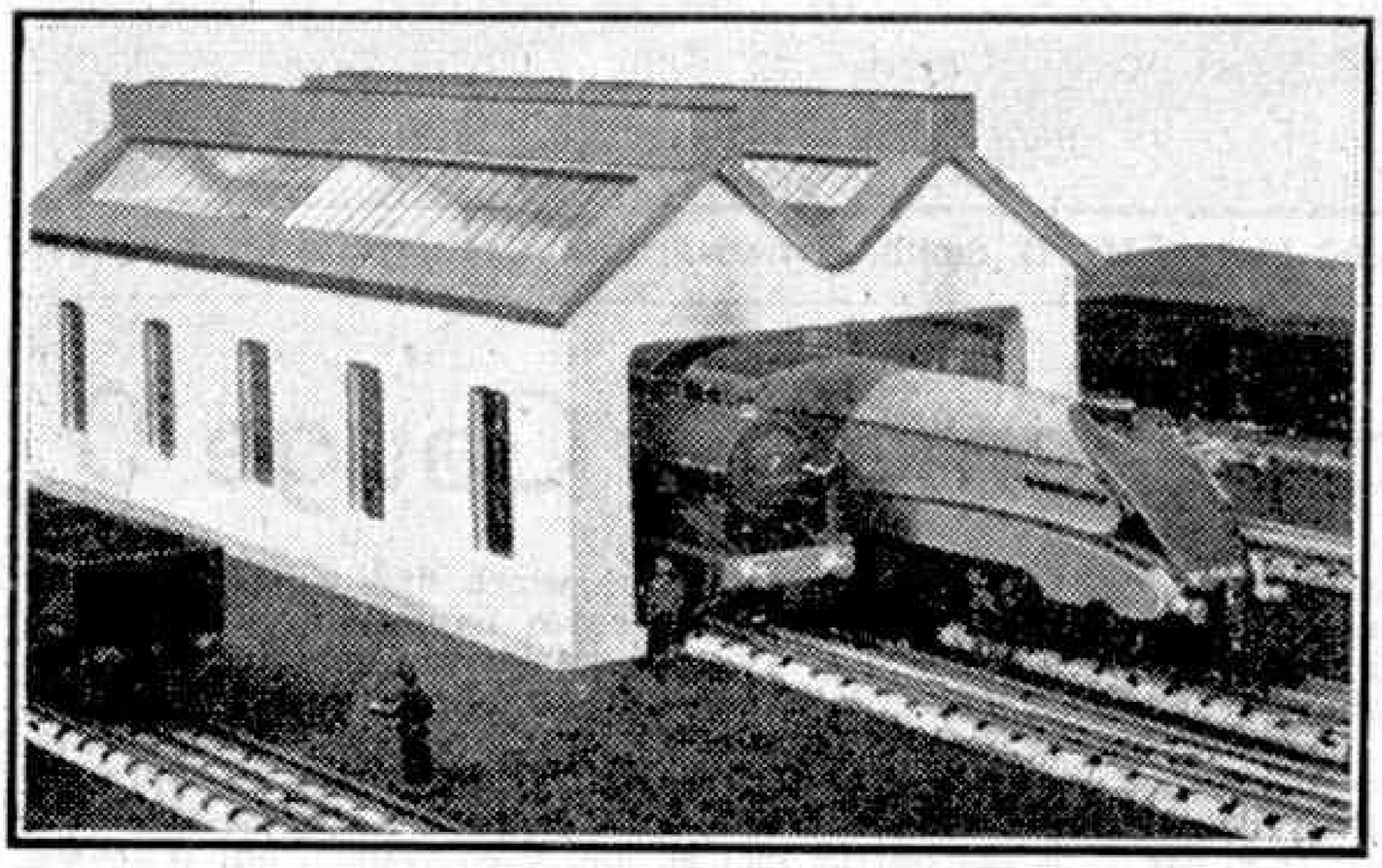
A feature is made of miniature loads, and the Goods Platform Crane deals with Containers, Cable Drums and various cases and packages that lend a busy air to the scene on the loading "bank." In addition to standard lineside Accessories of the Hornby Series, various items, including the two passenger stations and the tunnel, have been made at home. One topical item not often seen on a miniature railway is an air raid shelter!



A view of "South Lynn" Station on the same layout.

"Tuning Up" Dublo Locomotives and Stock

WE will begin with the track, since this is truly the foundation of successful running. The ends of the rails and the connecting clips below the track base should be examined in case any have become distorted through repeated connection and disconnection. For the rails a little gentle persuasion with a pair of small pliers will do all that is necessary;



Hornby-Dublo locomotives "at home" in the Engine Shed. The "staff" are busy preparing them for their duties.

for the clips, finger pressure is usually sufficient. The fishplates too here and there may need attention with the pliers, but great care is necessary or they may be squeezed up too tight for the rail ends to enter them.

All track becomes dirty in course of time. Dublo track, by reason of its solid-base construction, is easily wiped over with a clean rag. Special attention should be given to the rail heads; these must be wiped quite clean and dry from any oil deposit that may have formed on them. Points should be cleaned similarly, care being taken at the same time to see that the moving parts are free and clear from dusty "fluff" and so on. Make sure that the switch rails fit snugly up to the corresponding fixed or "stock" rails. If they require adjustment, bend them gently with the fingers.

With regard to the Locomotives, either clockwork or electric, little need be added to the simple instructions that are packed with Dublo Locomotives and Train Sets. It must be emphasised, however, that the correct grade of oil must be used, and not too much of that, when lubrication is being carried out. Removal of the motor from the bodywork allows all parts to be seen, and the special ring spanner for this purpose is shown in use in one of the accompanying illustrations. Don't lose this little gadget! It is much the best tool to use for the purpose shown.

Engine wheel treads should be kept clean, in fact this applies to all wheels; as a rule a "dry wipe" is all that is required. Sometimes, however, an obstinate patch of oily "mud" may be found at the base of the flange. An ordinary pin is quite handy here; its head being used to scrape off the offending material, while the wheels are revolved by hand, without any scratching of the wheel tread. Another little job for which the pin is very useful is for picking out dust and so on from the axle bearings, coupling rod pins and other similar spots where it persists in collecting. While attending to the wheels, examine the collector shoes and wipe them clean. Any oily "smears" or patches anywhere on the motor or the engine housing should be wiped off as they only encourage dust to settle and collect.

The tenders belonging to the Streamlined Express type of Dublo Locomotive require no special treatment. Their axle bearings are actually inside the wheels so they are easily got at for cleaning and oiling. See that the space between the outside main frames and the wheels is clear of dirt, etc., and make sure that the pivots of the "bogies" in which the wheels are mounted are free; a touch of oil here does no harm from time to time.

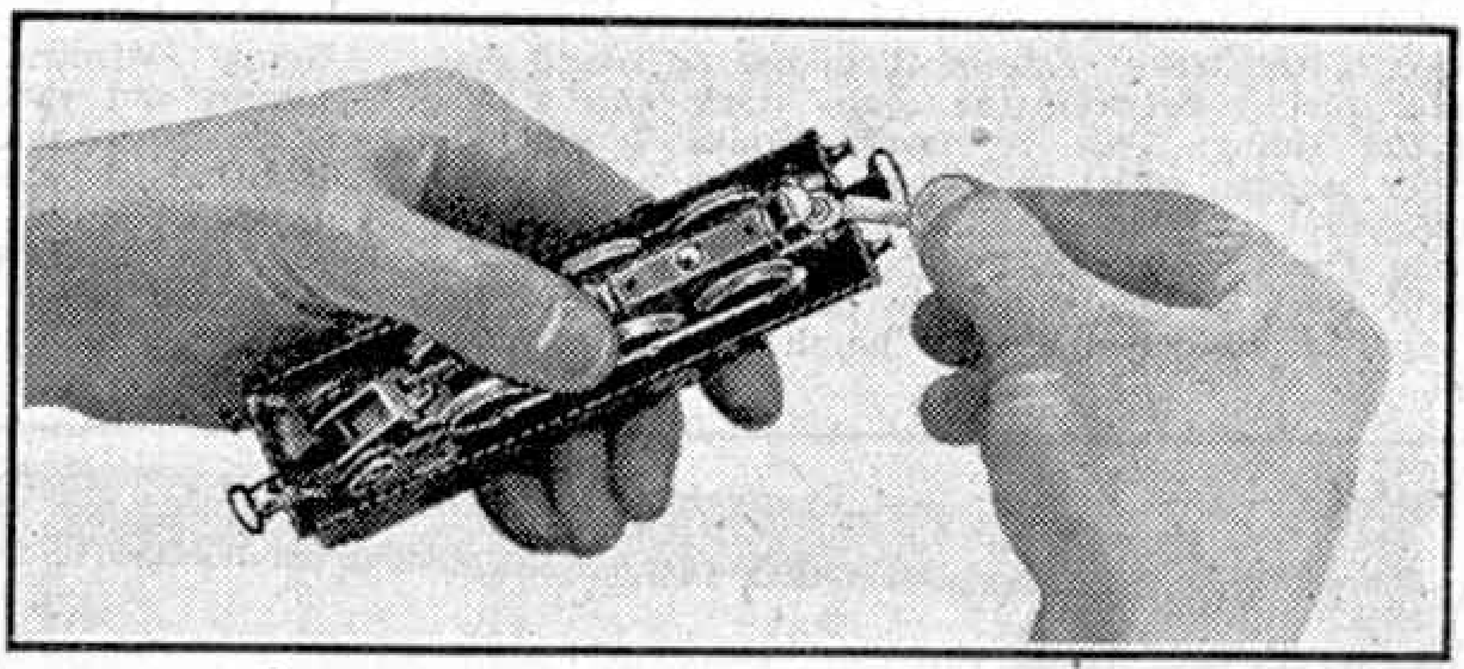
Dublo oil should never be put into an oil can. The dip "stick" or length of wire fitted to the cork of the Dublo oil bottle should always be used.

With Coaches and Wagons the treatment required is very similar. The cleaning of wheels and axle bearings makes a wonderful difference to the running. When oiling the axles apply the oil to the tinplate "hanger" in which the axles actually run; it will find its way on to the axle where it is wanted.

Bogie pivots of Coaches and of the bogie-fitted High Capacity Wagon should not be overlooked. When dealing with the Two Coach Articulated Unit it should not be forgotten that the two vehicles forming the "twin" can be separated by releasing the articulating bogie. This is done by means of the locking device underneath each of the two Coaches. The centre bogie can then be dealt with comfortably, the Coach bases cleaned, and the end bogies also attended to. When reassembling the Unit make sure that the tinplate corridor connection is fitted correctly and has no tendency to bind on curves. A spot of oil is required on each of the brass studs that form the pivots of the centre bogie of the Unit and the bogie can then be re-locked in position.

All couplings should be examined to see that they engage correctly. If they do not, gentle bending up or down should put them right. Only where the coupling loops have become deformed or the little "nibs" that project downward require adjustment, should pliers be used, and then only gently. It is not a bad plan to place a spot of oil on each coupling loop; it helps them to engage and also assists the running on curves.

Periodical attention to these details will do much to ensure the smooth running of the equipment.



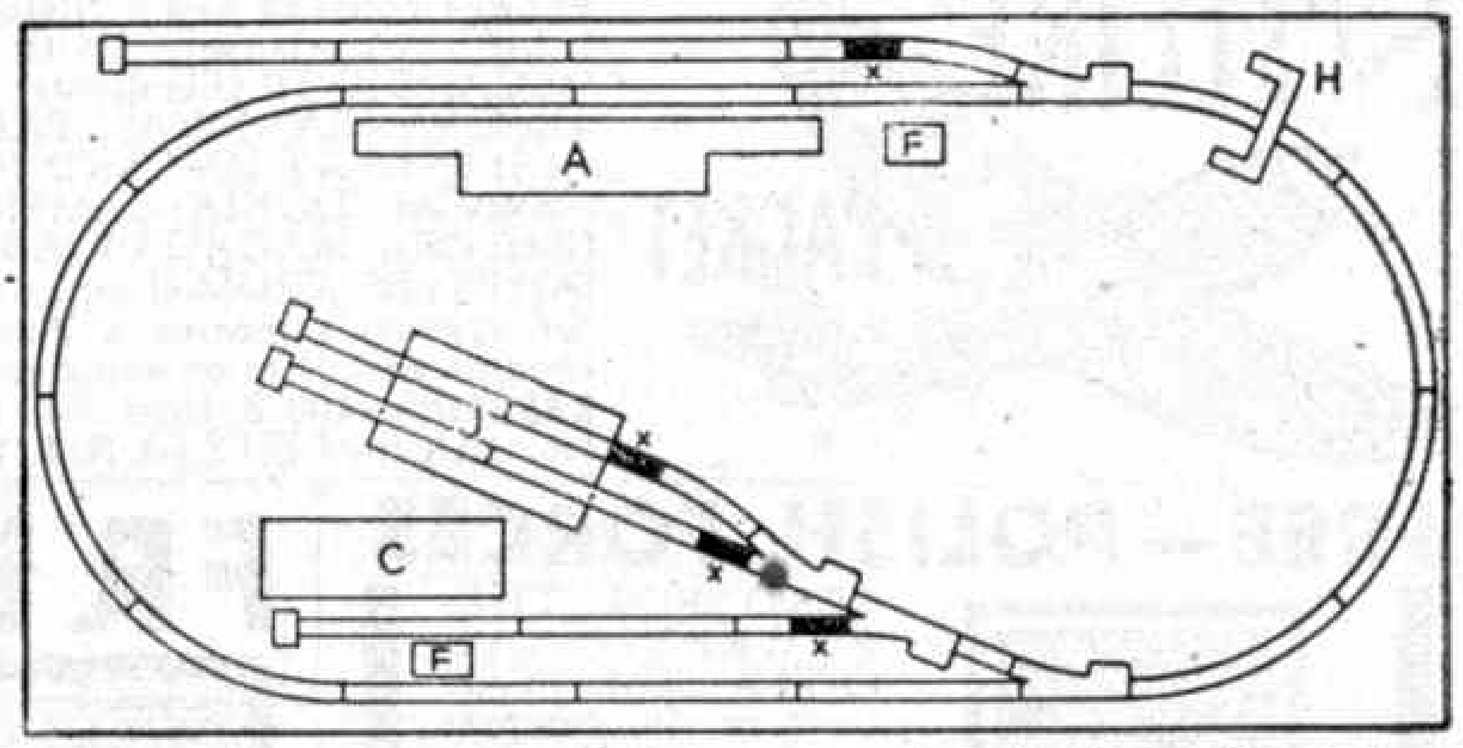
Using the ring spanner referred to in this article.

Points from various Dublo Layouts

THE layout shown in the accompanying diagram includes a continuous main line and the whole is accommodated in a space 6 ft. by 3 ft. The same plan can be followed either for an electric system, as shown in the diagram, or for a clockwork line.

The individual rails are shown clearly in the diagram. One point to notice is that on clockwork railways there will be no Isolating Rails. Ordinary clockwork type Straight Quarter Rails can be substituted for these; or where an Isolating Rail is adjacent to a Quarter Rail, a Straight Half Rail can be used instead of the two. The same thing will apply on electric layouts where only one engine is in use, as there is then no point in using the Isolating Rails.

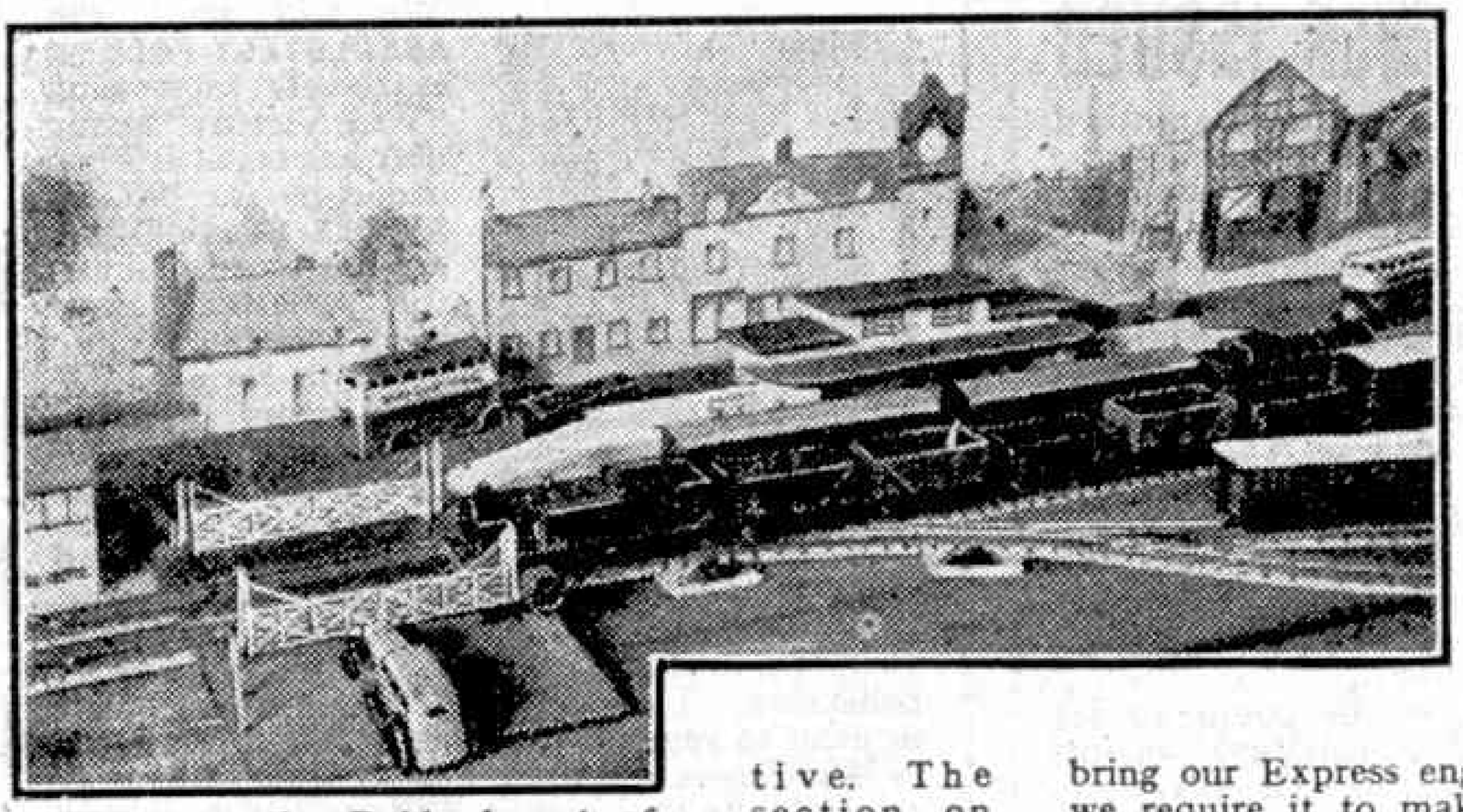
As all the main accessories are placed within the oval track, there is still space outside it to lay the long siding shown at the top of the diagram. This allows the siding to be of fair length for it can be extended will into the top left-hand corner of the layout space. On the opposite side of the main track to the siding is a standard Main Line Station. The lower half of the diagram is taken up by a diagonal branch from the main track which throws off two other lines of rail. The first lies parallel to the main track and serves the Goods Depot ; the other is made to form the second road in the Engine Shed, lying alongside the first track. Each of the sidings is of course terminated in the regulation manner by Buffer Stops.



A useful Hornby-Dublo layout for a space 6 ft. by 3 ft. The lettered Accessories are: A, Main Line Station; C, Goods Depot; F, Signal Cabin; H, Footbridge; J, Engine Shed; X, Isolating Rails.

Let us suppose that we have two Dublo Electric Locomotives, one on each of the Engine Shed Tracks and standing clear of the Isolating Rails on these tracks. The first one we will say is a 0-6-2 Tank and the second a 4-6-2 Streamlined Express Locomotive. The section on which the Tank is standing is switched in, the other remaining dead, so the 0-6-2 is moved slowly off the shed, past the points leading to the Goods Depot. These points are moved, the engine is reversed and brought up to some goods vehicles standing ready at the Depot. Then the Depot section of track is cut out and the engine is thus isolated electrically from the rest of the track. We can now switch in the other Engine Shed road and run our Streamliner tender first on to the main line round the curve, under the footbridge and into the Station siding.

In the siding we keep our passenger vehicles, so the engine couples up. Both our trains are now ready to go, but one must of course wait for the other; not only is our main line single track, but also we can only run the one train at once on the same track. So we keep the goods train waiting, and move our passenger train out on to the main line to make an "empty stock" run round to the Station where its actual journey will begin. The length of this will depend on the timetable arrangements; stops can be made at the Station on different circuits until the journey is over. When the destination is reached the "passengers" alight and the engine draws the coaches out of the Station clear of the points and then backs them into the siding.



A scene on the Dublo layout of Mr. R. S. Bache, of Birmingham. The home-made level crossing has working gates and the scenery is very effective.

By now of course our goods train engine has become very restive, so we switch out the Station siding section to isolate the Express engine, and then we can switch in the Goods Depot section and allow the freighter to pass out into the main line. It can make a through run if desired, or it can be stopped on the main track while the engine perhaps puts one vehicle into the Depot track and maybe picks up a couple of Open Wagons from the outer ends of the Shed tracks. In between these moves we can at a convenient moment bring our Express engine back into the Shed, unless we require it to make another journey fairly soon. On another occasion our goods train can halt as before and put off a couple of wagons of "loco coal" for the Shed. So we can go on varying the routine until finally we bring the train to rest clear of the main line points and put it back into the Depot track where it started from.

These operations represent just a few typical evolutions that are possible; Dublo owners can themselves alter the layout in detail if required and develop their own variations of the workings just described.

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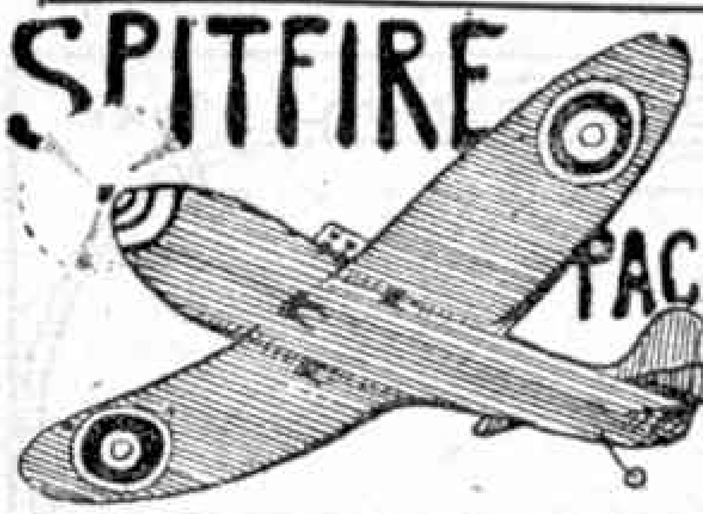

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Other Stamp Advertisements on pages 392 and viii.

Stamp Collecting

British Stamps from the Mediterranean

By F. Riley, B.Sc.

THE triumphs of recent months, beginning with El Alamein, have gained for the Allies the mastery of the Mediterranean. This was never wholly lost, but the onslaught of German bombers in the narrow seas around Sicily practically closed those waters, except to armed convoys that fought their way through, with the effect of leaving Malta in a state of siege. How gallantly this siege was sustained is now well known, and never was the award of the George Cross so splendidly earned.

Malta is the central British stronghold in the Mediterranean, and the other two in that sea are Gibraltar and Cyprus, the one at the western gates and the other in the east. All three have played and will continue to play very important parts in the war of liberation. Because of this it is interesting to turn to their stamps, many of which are of the very fine pictorial type that has made British Colonial stamps of recent years so extremely attractive.

We may begin with Gibraltar, the giant rock with an area of about two square miles that rises at the western entrance to the Mediterranean. More than 2,000 years ago it was thought to be at the end of the world, for with a smaller rock on the African shore opposite it formed the Pillars of Hercules, beyond which was nothing but the storms and dangers of unknown sea, at any rate for the civilised peoples of the Mediterranean. It is a wonderful spectacle when the great rock gradually looms up before the visitor. On its northern side it rises precipitously to a height of 1,200 ft. from the sandy isthmus connecting it with Spain, and the eastern side, facing towards Italy in the Mediterranean, is equally steep. Only on the western side is there low land with room for a city, and there the great harbour has been constructed.

Gibraltar is a rock of sieges. For centuries it was fought for by Christian and Mohammedan opponents, and 11 sieges are recorded for it during the struggles that went on before the Moors were finally pushed back into Africa. The Rock was attacked and taken by a British and Dutch fleet in 1702, and every time war broke out on the Continent after that there was either a threat to Gibraltar, or an actual attack on it. The most memorable of these came in 1779 and lasted for four years.

Gibraltar's own stamp history does not begin until January 1886. This was the result of a decision to establish a post office in Gibraltar. For some reason the Royal Assent to this project was not given until December 1885, which left precious little time in which to print stamps. Because of this plates designed for printing the stamps of Bermuda were brought into use, and the stamps were overprinted with the word "*Gibraltar*." These stamps did not remain in use very long, for in the following December real Gibraltar stamps appeared, printed from plates engraved specially for the purpose. These of course bore the head of Queen Victoria, and were of the usual colonial style of that time.

There were no outstandingly novel features in later stamps, except that in two or three issues Spanish currency was used, so that we have Gibraltar stamps marked with centimo and peseta values as well as the familiar 1d., 1/–, etc. There is one stamp that does call for attention as a curiosity, however, for it appeared without a value figure. It is of the 1889 issue and is carmine in colour, so that it was an error of the 10 c. Spanish currency stamp.

All of these earlier stamps of Gibraltar are of the very greatest interest to collectors, and most of them are now rather costly. It is not until 1930 that we come across modern pictorials from the great fortress, and these make a very fine show in our albums. There were four stamps in the series then issued, from 1d. to 3d. in value, each showing a view of the rock, with a portrait of King George V in the top right-hand corner. This was followed in 1935 by the Silver Jubilee issue, with which many of our readers will be familiar. This too appeared in four values, from 2d. to 1/–, in various colours, and the design was the handsome and popular Windsor Castle one that was similarly used for many colonial stamps. Those who are interested in varieties should keep a lookout for stamps in which the flagstaff on the tower of the Castle is double, for this well-known variety occurs in all four values.

In the following year came Gibraltar's Coronation issue, again the well-known colonial design bearing portraits of the King and Queen, and this was the prelude to a handsome pictorial set that appeared in March 1938. The lowest value, ½d., was a small stamp with a portrait of the King on it. This is illustrated here, together with examples of the larger pictorials of the series. As our reproduction shows, the 1½d. value depicts the rock itself, a view used in the previously issued George V set, but this time the King's head appears in the top left-hand corner. The 2d. stamp, illustrated here, shows a view of the north side of the rock, and on the 3d. stamp, also reproduced, we can see Europa Point, its southern tip pointing out to Africa. Among other subjects illustrated in this series are Government House, a Moorish castle and the memorial of Sir George Elliot, who commanded the garrison during the great siege of 1779 and was created Lord Heathfield in recognition of his marvellous defence.

(*Continued on page 393*)

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Other Stamp Advertisements on pages 390 and viii.

Stamp Gossip

and Notes on New Issues

Free French Stamps from Djibouti

The most interesting of recent Free French stamps are those issued from Djibouti, in French Somaliland, or the French Somali Coast, to use the official term.

Earlier in the year a long list of stamps of existing design appeared with the words "*France Libre*" overprinted, or additionally surcharged with a new value. The stamps were from earlier pictorial issues, showing a native drummer, a Somali woman, Somali warriors, Djibouti itself and a mosque in the city, while a portrait of Governor L. Lagarde also was included. There were 41 stamps in this issue and in addition there were 18 postage due stamps also overprinted with the words "*France Libre.*"

Now a definitive French Somali Coast issue has appeared. This comprises 14 stamps of the entirely new design shown in the illustration on this page of the 5c. value. The central feature is an "Atlantic" locomotive without its tender, a reminder of the unique position Djibouti holds as the railway gate to Abyssinia. The only railway in the country runs from Djibouti on the Red Sea coast, to Addis Ababa, the capital. Representations of a native hut and a dhow, with conventional palms waving in the spaces between the working, complete quite an attractive design.

The Free French island Reunion, in the Indian Ocean, also has issued a provisional set of stamps consisting of existing designs with the usual "*France Libre*" as an overprint. This too is a long set, consisting of 45 stamps with four air stamps, making 49 in all. The subjects of the design are scenes in Reunion, with a map on the 4c. value. The air stamps show a low wing monoplane flying over mountainous tropical country, presumably the island itself.

While we are on the subject of French stamps we are sure that readers will be interested in the Vichy issue illustrated here, although it cannot be bought in this country, as can the many attractive Free French issues that are finding their way into our albums. It is a special issue with an additional charge, for the purpose of raising funds to fight cancer. This scourge is represented in the design by a dragon or monster with five heads, and a sword science or knowledge in the shape of a stern female figure armed with a sword is about to attack it.

Stamp Collecting—(*Continued from page 391*)

Malta, G.C., the second of our Mediterranean strongholds, is also a place of sieges and has had a most eventful history, which is not surprising, as it is a key point in the Mediterranean Sea. Malta itself, or Melita, is the largest of a group of islands and is about two-thirds the size of the Isle of Wight. The next largest is Gozo, which is only nine miles in length.

The value of Malta lies in its splendid harbour facilities. It has many deep bays, and the capital, Valletta, is built on peninsulas and round the inlets they enclose. The island has seen the passing of Phœnicians, Carthaginians, Greeks, Romans and Arabs. It early attained a very high degree of civilisation and prosperity, and was particularly famous for its fabrics, probably of cotton. St. Paul was shipwrecked there, and the tradition is that he converted the islands to Christianity during his stay of three months in them. Later it was conquered by the Saracens, and then it came into the possession of the Knights of St. John, an order that had for its mission the clearing of Turkish and Saracen pirates from the Mediterranean and the protection of Christians from the Turks. The Knights did heroic work for several centuries and on one occasion sustained a great and prolonged siege by the Turks, who made an immense effort to seize the stronghold from them.

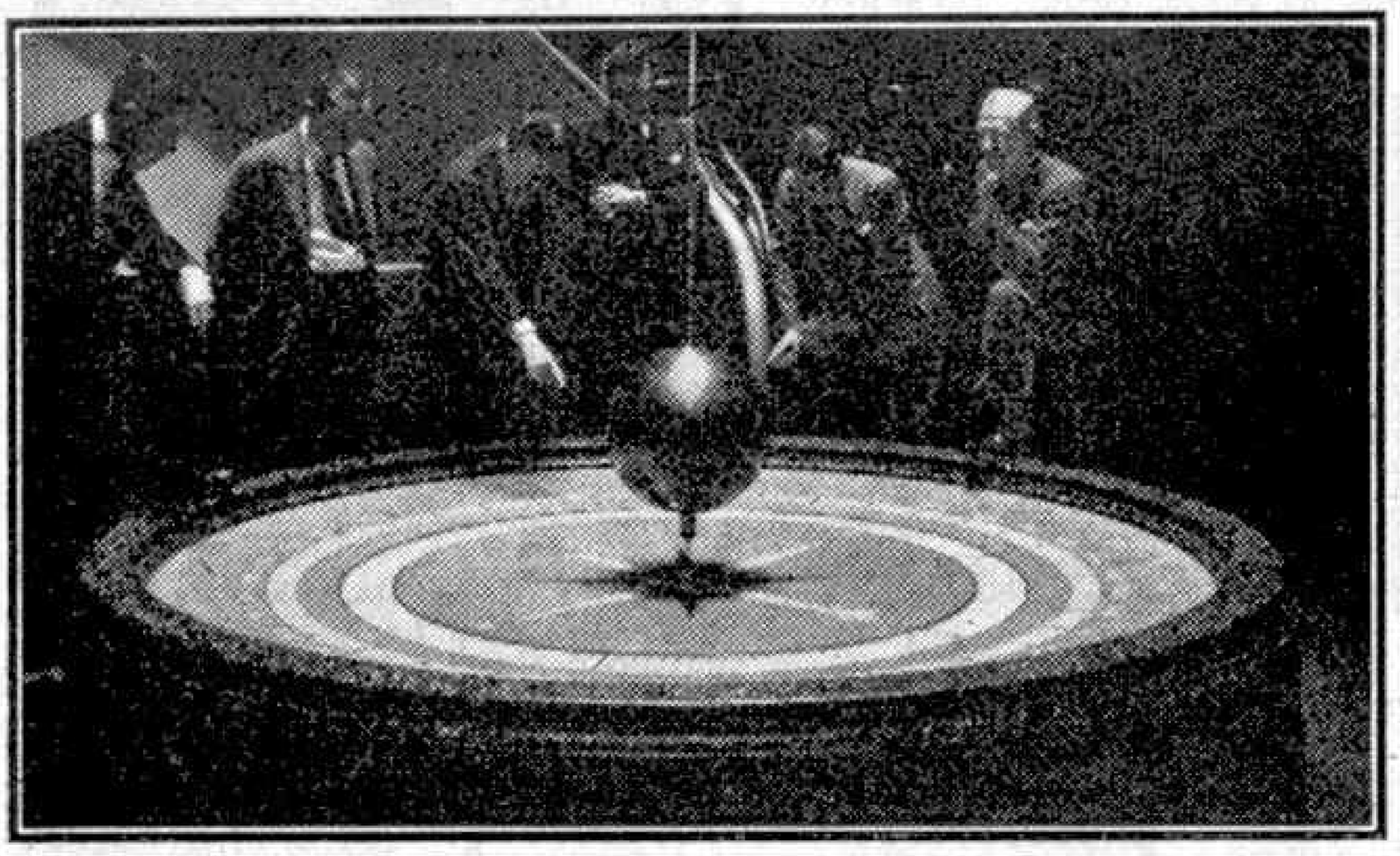
Our own connection with Malta dates from Napoleonic times. When Napoleon sailed to Egypt he took possession of the islands on the way, but the Maltese rose in arms against the garrison he left behind him and forced it to surrender. In this effort they were helped by a small British force and they voluntarily placed themselves under the protection of the British, a step that was confirmed when peace came.

The stamps of Malta have provided interesting pictures. Two of these, the Castle of St. Angelo and Victoria, the capital of Gozo, with its Citadel, are reproduced on this page; next month we shall briefly review the stamps of Malta and those of Cyprus.

PROVING THAT THE EARTH TURNS

By M. Lorant

The first experimental proof that the Earth actually rotates around an axis was given in 1851 by B. L. Foucault. The noted French scientist used a steel wire to suspend a heavy ball from the centre of the famous dome of the Pantheon, in Paris, spreading a fine layer of sand on the floor beneath. By means of a thin but strong thread, he drew the ball well up to one side, and he waited until it was completely at rest. Then he burnt the cord, thus freeing the pendulum, so that it began to swing in one plane. Soon the eager observers could see that the plane of swing appeared to turn slowly in a clockwise direction. In fact this plane cannot vary, and the truth was that the Earth was moving in the opposite direction. The plane of swing of the pendulum would appear to make a complete revolution in one day at the North or South Pole, and at the Equator it would not show any turning at all.



Proving that the Earth turns. The giant pendulum, 65 ft. in length, in the Hall of the Chicago Museum of Science and Industry, that seems to alter in direction as it swings to and fro.

The Chicago Museum of Science and Industry has recently reproduced this fundamental scientific experiment by installing a 65-ft. Foucault pendulum in the Hall of the Museum. The bob of the pendulum is a hollowed ball weighing 350 lb., cast of bali-metal bronze to avoid magnetic interference.

All Among the Bombers—(*Continued from page 366*)

Officer's table with his crew behind him, snapped smartly to attention, and, in the best B.B.C. manner began: "This is the 3 a.m. line. And this is Flight-Lieutenant Jones shooting it." In fact bomber captains are not given to line-shooting, except for fun, and their reports are amazingly clear, considering what they have been through just before.

There are still other categories about which I could write if I had room. There are the Padres, who do a great deal of valuable work. There are the Doctors, some of whom are good, and many of whom (I say it deliberately of my own knowledge) are not. There are Press Officers whose job is to be polite to the local Press and to newspaper visitors from other parts, and to see that they get good stories and do not learn too much. Some of them are excellent, but they have their hearts broken by sending good stories to H.Q. and seeing them come out mangled and super-hydrated in Air Ministry bulletins.

Bearing in mind all those variegated people who work on the ground to keep our bombers in the air, can one be surprised that if 1,000 bombers are sent out on a raid at least 100,000 people are concerned with sending them out properly armed and equipped and bringing them safely home again? I am surprised that the number, which has been stated by people who ought to know, is so small.

The "Butterley" Standard Bridge—

(*Continued from page 375*)

accuracy enabled the parts to be fabricated with ease and rapidity at extremely low cost. The standard of interchangeability was such that the pins at all intersections were immediately inserted, including the pins for the final joining.

The bare minimum of material was brought to the site, and as soon as the men had finished, the bridge was put into use. There was no clearing up required, and no tackle other than the standard davits, spanners, etc., was used. These davits are a feature of the design, and are so made as to be attached in cups and sockets to each bay as the work progresses, greatly simplifying the positioning of the various units as erection proceeds.

The Butterley system permits the side structure to be built up either as a construction employing a single row of box girders, as in the bridge now described, or in a double or triple row of box girders at each side of the bridge, the extra box girders being erected alongside the original box girder at each side and secured by tie bars and distance pieces through the centre holes in the connecting bobbins. Heavy type bridges of long span can be of double tier construction below or above the main tier.

A bridge similar to that described, of 60 ft. span, of single-girder construction, is in use as a single-track railway bridge.

The Tractor on the Farm—(*Continued from p. 363*)

Britain to overcome the threat to her food supplies, making it possible to plough up millions of acres in a few months, despite the acute shortage of skilled man power.

Many developments have taken place since then. Not only has the design of the tractor advanced, but farmers have become more familiar with its operation and have found in it a means not only of saving time and money, but of doing better work than was possible when they had less power at their command. The result is that tractor farming is becoming the rule instead of the exception.

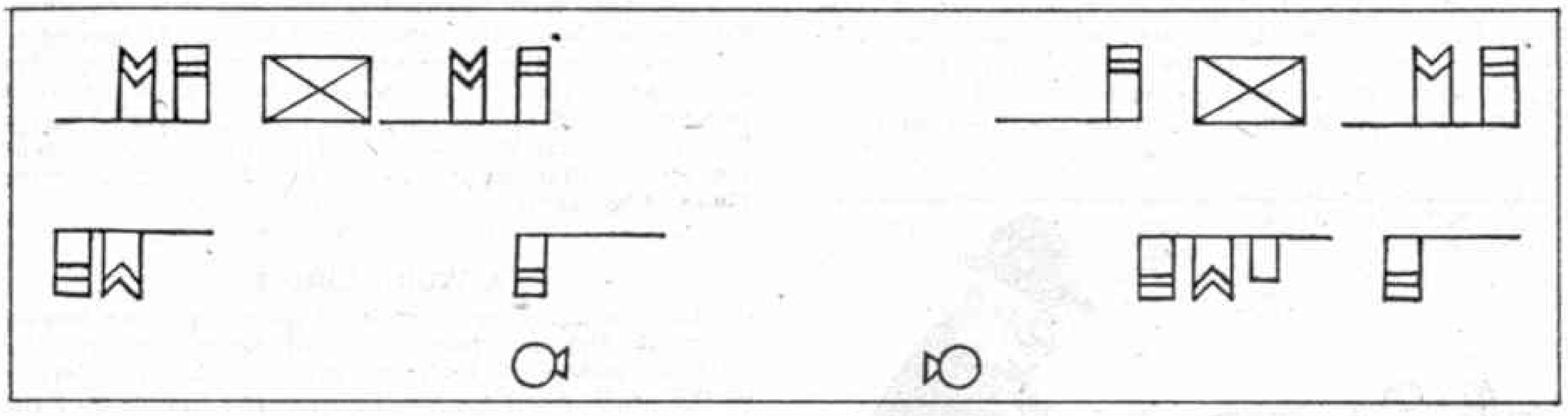
BACK NUMBERS OF THE "M.M."

A few copies of each of the following back numbers of the "*M.M.*" are available for disposal. The cost is 8d. each, including postage, etc. This is a splendid opportunity for readers to fill in any gaps in their sets of wartime issues, and early application is advisable. Orders should be sent to Publishing Department, "*Meccano Magazine*," Binns Road, Liverpool 13, and should be accompanied by the necessary remittances.

1940. January, February, April, May, June, September, December.
1941. January, February, April, May, June, July, August, September, October, November, December.
1942. January, February.
1943. June, August, September, October.

Competitions! Open To All Readers

Find the Missing Rails



In past contests we have often given readers a railway layout and asked them to signal it correctly. This month we are reversing this process. On the illustration on this page we give the positions of the signals, and competitors are asked to restore the missing tracks.

The diagram will be easy to follow. Both home and distant signals are included, and these will readily be identified, as will the special signals such as the ground signals. The oblongs marked with diagonals represent signal boxes. It is clear at a glance that on the layout there must be crossovers and other features that are to be found in the vicinity of stations, and it will be good fun to track down the positions that these must have to justify the signalling arrangements that are indicated. The signal arms or semaphores of course are not at all in correct proportion; they have purposely been made larger than they would be in reality in order to make the diagram perfectly clear.

Every reader of the "*M.M.*," whether he is a member of the H.R.C. or not, is invited to send in an entry in this contest. The diagram should not be cut out. Instead a good copy should be made, and the tracks drawn in the positions the competitor thinks they should occupy. The result should be sent in to "*November Missing Rails Contest, Meccano Magazine, Binns Road, Liverpool 13.*" The name and address of the entrant must be written on the back.

The Contest is divided into two sections, for Home and Overseas readers respectively, and in each prizes to the value of 21/–, 10/6 and 5/– will be awarded for the best solutions. If there is a tie for any prize, neatness and novelty will be taken into consideration by the judges. The closing dates are: Home Section, 31st December; Overseas Section, 30th June, 1944.

A Novel Word Contest

In the "*M.M.*" there have been many word competitions that involve sorting out mixed or jumbled words, or putting the right words in the right places. Here is a new type, in which there is room for what we may call creative ability on the part of readers.

The idea of the contest is that competitors should make up real sentences from fragments that in themselves are unintelligible. We can make this clear by taking as an example the two words "Balloon without." These seem meaningless, but they can be worked into the humorous definition "Nothing is a barrage balloon without the skin."

Below we give a list of odd phrases of this kind, all of which can be extended in this manner:

1. ..... a knife said .....
2. ..... school with a smile .....
3. ..... of days of that and I .....
4. ..... street with the least sound .....
5. ..... first last .....
6. ..... milk a bicycle .....
7. ..... roads annoyed .....
8. ..... behind before .....

Competitors should work out for themselves good sentences in which these fragments are used, and the prizes in this contest will be awarded for the best lists of sentences submitted. The judges will look particularly for wit and humour in the entries, but if a phrase does not seem to lend itself to humour then fit it into the best sentence you can make up. Thus the scheme is easy to follow. Make up sentences containing these phrases and make them as funny as possible.

There will be the usual two sections in this contest, for Home and Overseas readers respectively, and in each there will be three prizes of 21/–, 10/6 and 5/– respectively, together with consolation prizes for the efforts that miss one of the principal awards, but are deserving of recognition. Entries should be addressed "*November Word Contest, Meccano Magazine, Binns Road, Liverpool 13,*" and those in the Home Section should be posted to arrive here not later than 31st December. The closing date in the Overseas Section is 30th June, 1944.

November Photo Contest

This month's contest is the 11th of our 1943 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions: 1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired, but entries in which the second condition stated above is not observed will be disqualified.

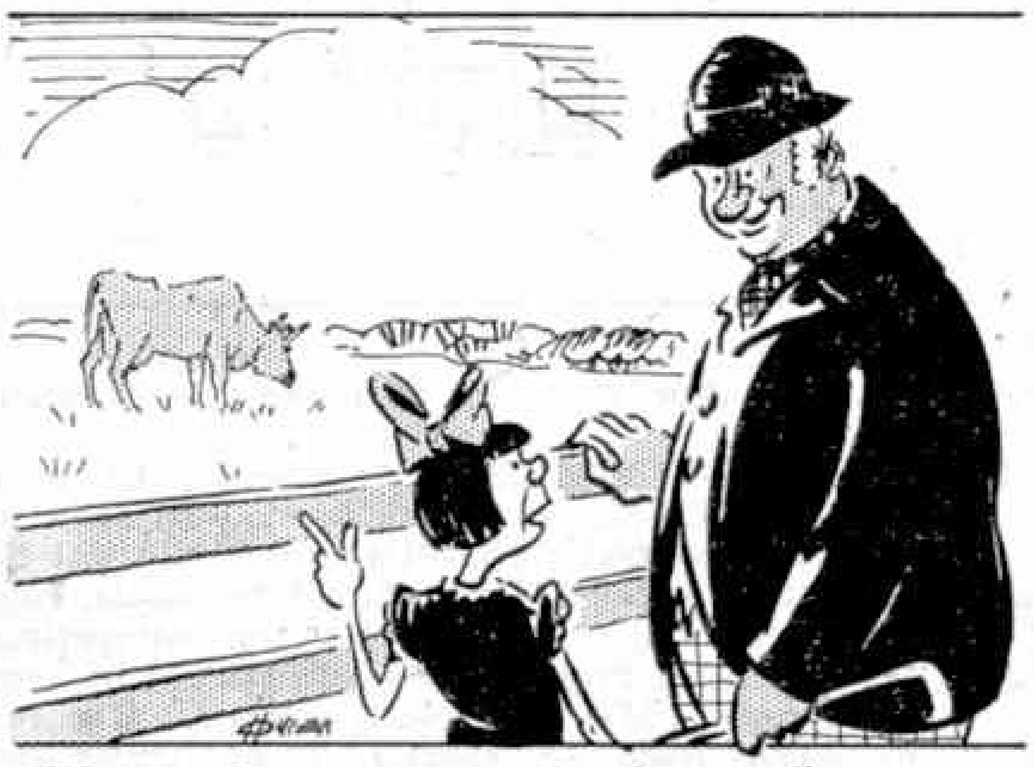
Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16, and all entries must be clearly marked with the section letter. They should be addressed "*November Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 30th November; Overseas Section, 31st May, 1944.

Fireside Fun

Teacher: "Now I have told you about what doctors can do for you. Have any of you any questions to ask?"

Tommy: "When a doctor falls ill and gets another doctor to doctor him, does the doctor who doctors him doctor him as the doctor doctored wants to be doctored, or does the doctoring doctor doctor as he wants to doctor himself, or as he himself would like to be doctored if another doctor doctored him?"

* * * *



"Hasn't that cow got a lovely coat."
"Yes, little girl. That's a jersey, you know."
"A jersey! I thought it was its skin."

* * * *

Old Lady: "You're an honest boy. But I lost a £1 note, not 20/- in silver, didn't I?"

Errand Boy: "Yes, mum. But last time I found a £1 note the lady didn't have any change."

* * * *

Teacher: "Now which is the worse, to hurt a man's feelings or to hurt his hand?"

Small Boy: "To hurt his feelings, sir."

Teacher: "Very good. Now, why?"

Small Boy: "You can't wrap his feelings in a bit of rag, sir."

* * * *

Father: "You're always bad in history. Why is that?"

Son: "How can I help it? They will ask me about things that happened years before I was born."

* * * *

"Yes, madam, most of the foods we sell contain starch."

"Ah, so that's why the price is so stiff."

* * * *

"That's our new sergeant."
"Oh, really."
"No, O'Reilly."

BRAIN TEASERS

A BUS MYSTERY

Two men who boarded a bus together sat down side by side. To the first, who held out twopence to the conductor, the latter said "1½d. or 2d.?" to receive the reply "1½d." The second man also held out twopence, and this time the conductor handed out a 2d. ticket without question. How did he know that the second man wanted a 2d. ticket? Quite easy for those who keep their eyes open.

* * * *

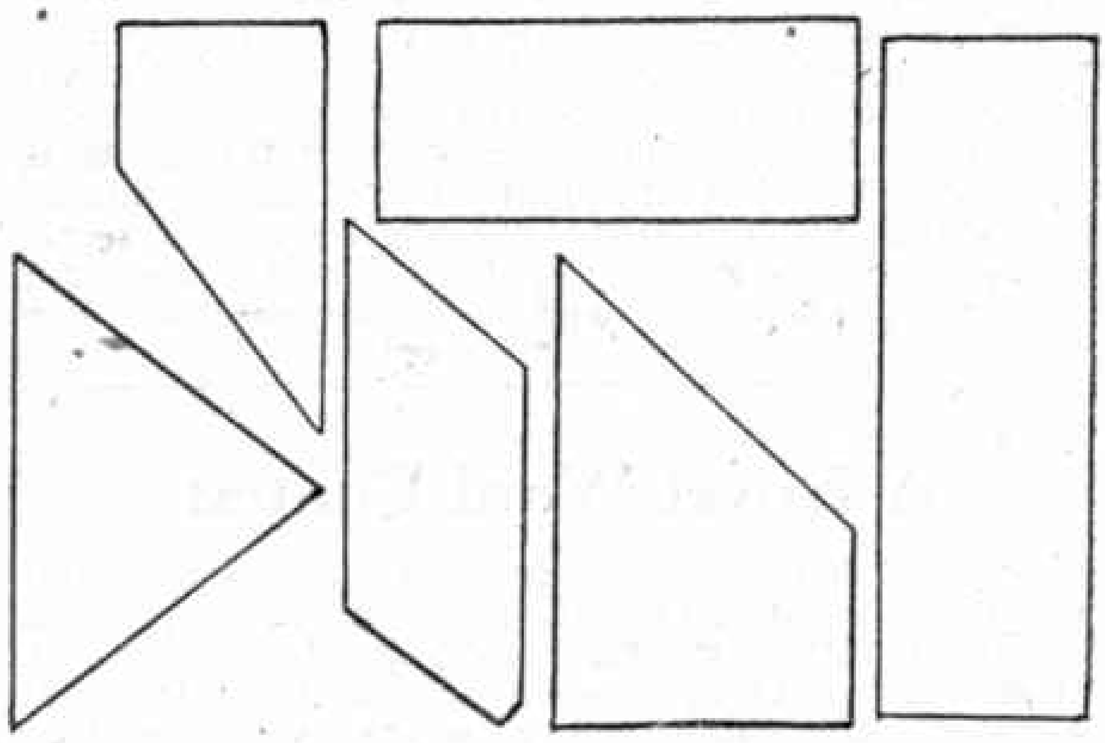
A WORD CIRCLE

Can you make up a circle of nine five-letter words, in which the last two letters of each word are the first two letters of the next word. The last two letters of the ninth word are the same as the first two of the first word, thus completing the circle. The clues are as follows: 1, Wait; 2, Edge; 3, Sort; 4, Court Official; 5, Rub out; 6, Number; 7, Come in; 8, Wear away; 9, Thick. T.K.C.

* * * *

WHAT LETTER WILL THESE MAKE?

The six shapes shown below when put together make up a capital letter. What can you make of it? Do not spoil your Magazine by cutting out the pieces. They can easily be traced or copied.



* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

Those who know their x's and y's will have no difficulty in finding that the keeper of a zoo in our first problem last month had 58 animals and 46 birds in his charge. For those who are not familiar enough with algebra here is a simple solution. There are 104 creatures altogether, since that is the number of heads, so that if they were all birds there would be 208 feet. For every animal substituted for a bird the number of feet would be increased by 2. The actual increase is 324 less 208, that is 116. Thus the number of animals must be half of 116, that is 58.

Our pocket money puzzle is easy to solve. Philip obviously has 5/-, since this is the amount that would be increased by half if 2/6 were added. This must be 1/6 more than Henry possesses, so that Henry's pocket money amounts to 3/6.

In our unusual division sum 8,290 is divided by 13, the result being 637, with a remainder of 9. After settling that D is 0, it is clear that E must be 1, and only 9 therefore will fit C. Then the 91 must be 7 times 13, so that the divisor is 13. The rest is simple.

* * * *

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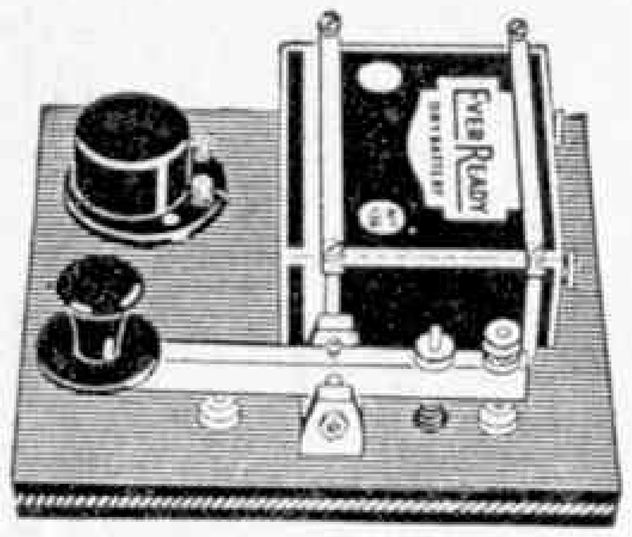

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Consequently we will not be able to purchase or supply any further metal model goods to our clients until further notice.

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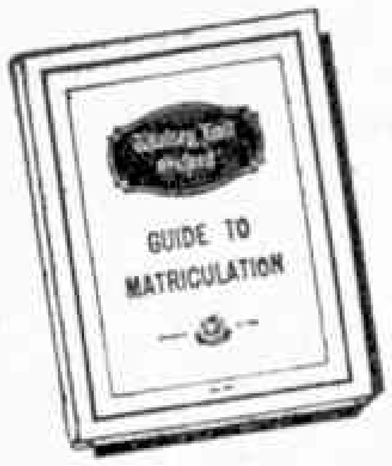

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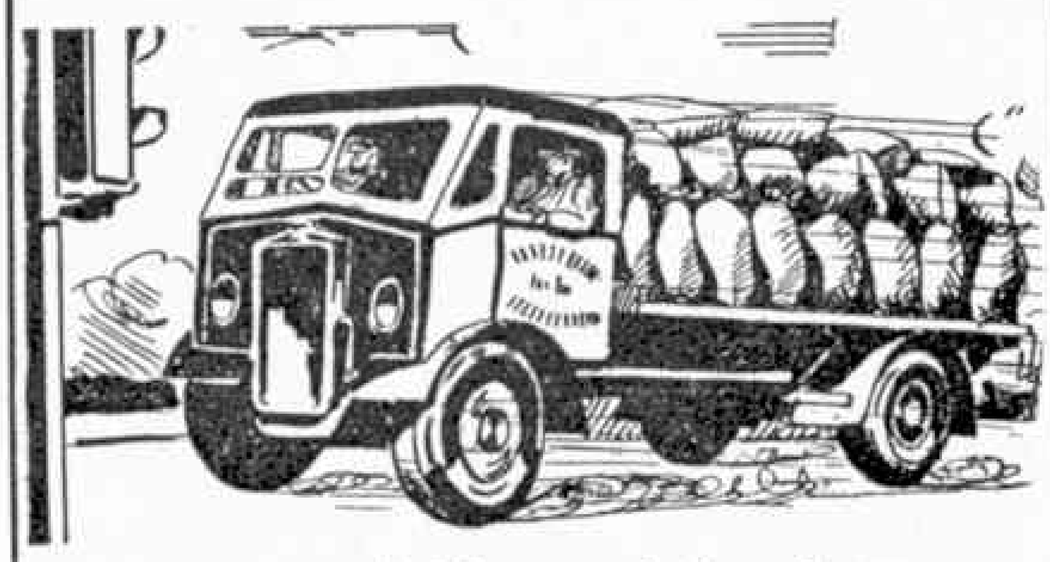

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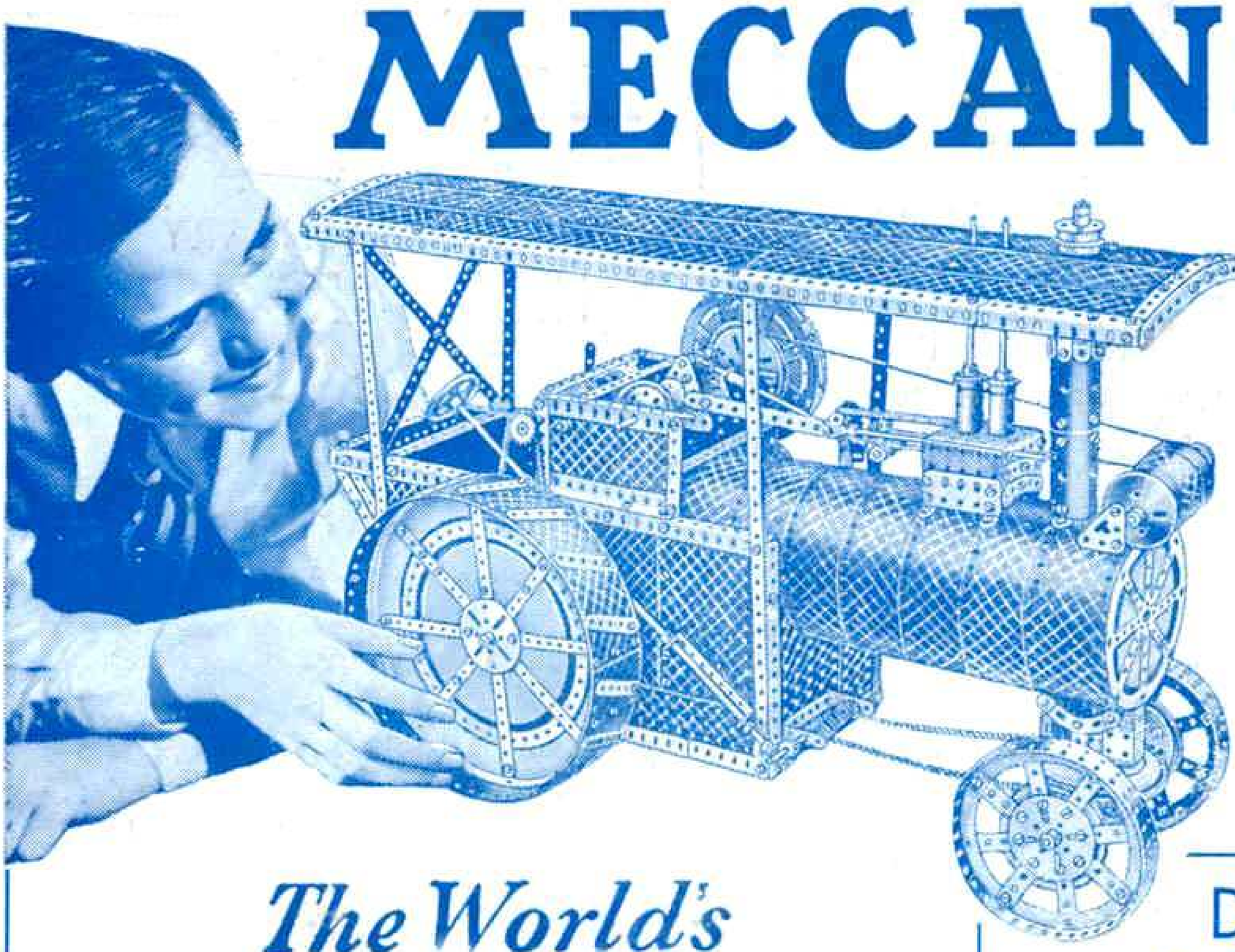

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